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# Gauging the Reliability of Costa Rica's Certification for Sustainable Tourism

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Gauging the Reliability of Costa Rica's Certification for Sustainable Tourism

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A thesis submitted to the  
University of Colorado at Boulder  
in partial fulfillment  
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## **Abstract**

Costa Rica's Certification for Sustainable Tourism (CST) is a program designed to encourage the Costa Rican hotel industry to implement sustainable practices that maintain the country's image as a world leader of nature-based, conservation-based tourism. This study investigated the strengths and weaknesses of the CST to gauge the reliability of the acclaimed program. Conducting extensive background research, reviewing previous literature, performing a case study and comparing the CST to two other distinctive programs helped to determine what factors contribute to and hinder the program's reliability. In the case study, stream quality data suggested black-water pollution of the Quebrada Sin Nombre ("No Name Stream") by El Establo Mountain Resort, a certified sustainable hotel in Monteverde, Costa Rica. This research helped to determine that there are several inadequacies that the program must address in order to ensure its credibility and create a certification seal that consumers can trust. Analysis showed that while the CST provides adequate consumer access to online information, it has failed to update this information and the program's criteria to reflect improved technology and improved knowledge regarding sustainability. While the program is credible in that it requires third party verification, it fails to frequently audit hotels to verify compliance. In addition, while the program integrates a well tiered, five-level system, the minimum required compliance for certification sets the bar too low. Little quantifiable evidence was found regarding the CST's ability to promote sustainable change. As a result, seven recommendations were produced for the CST to use as a platform to ensure its credibility and its ability to produce sustainable outputs: (1) *Expanding financing options*, (2) *Increasing the baseline for certification membership*, (3) *Implementing standards that measure the hotel's impacts*, (4) *Creating a more stringent auditing process*, (5) *Improving and marketing the certification's nomenclature*, (6) *Publicizing information, enabling consumer input and increasing market demand* and (7) *Incentivizing hotels*. Costa Rica represents only 0.01 percent of the Earth's surface while harboring more than five percent of the world's biodiversity; therefore, successfully implementing a sustainable tourism scheme in Costa Rica can have global impacts.

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## **Preface**

While partaking in a Tropical Ecology and Conservation study abroad program in Summer 2012, I conducted independent research relating to stream quality in Monteverde, Costa Rica. I investigated whether Odonates (dragonflies and damselflies) can be used as biological indicators of stream quality in neotropical cloud forests by measuring physical parameters of stream quality and collecting Odonate samples at three sites along a stream. The first site was located near the stream's headwaters, the second site below a large hotel (El Establo), and the third site in an urban environment. I found that because these organisms integrate environmental conditions over long periods of time, they can serve as tools for monitoring water quality and watershed health, especially in developing countries where water quality is a growing concern. Tangentially, I found evidence that suggests that El Establo Mountain Resort had contributed to declining Odonate populations, most likely through black-water effluent. This suggestive evidence let me to question the reliability of Costa Rica's Certification for Sustainable Tourism program, as El Establo is a certified sustainable hotel. Thus, my honors thesis was born and I have finally answered the question.

I would first like to thank Dr. Karen Masters, who helped me not only to develop my initial independent research project, but who sparked my interest in Costa Rica's Certification for Sustainable Tourism. I would also like to thank Dale Miller, Dave Newport and Dr. Mark Williams for taking their time to advise me and serve on my committee. My honors thesis project would not have been possible without the guidance from these four wonderful people.

## **Introduction**

In response to the growing international awareness of anthropocentric impacts on the environment, notions of “eco-tourism” and “sustainable tourism” have surfaced in recent decades to combat the negative impacts that tourism can have on natural resources and global ecology. Costa Rica, one of the world’s most prominent nature-based tourism destinations, has taken full advantage of the ever-growing ecotourism market, that is, nature-based tourism with the welfare of the local environment, economy and culture in mind. However, as environmentally-friendly or sustainable goods and services continue to grow in the global market, “green washing” becomes a problem. This term is used to describe the false labeling and marketing of “green” or environmentally-friendly products, and its practice has the potential to damage Costa Rica’s reputation as an environmentally-conscious country (Dasenbrock 2002). To counter this deceptive practice of green washing and to validate the emerging industry of ecotourism, Costa Rica devised a system to legitimize the green-labeling associated with its hotel industry, known as the Certification for Sustainable Tourism (CST).

Though the CST aims to encourage the hotel industry to implement environmental practices that maintain the country’s image as a world leader of nature-based, conservation-based tourism, it is difficult to assess the effectiveness of the certification program. In this study, I sought to gauge the overall reliability of Costa Rica’s Certification for Sustainable Tourism. I wanted to know if consumers can be guaranteed that the eco-hotel they reside in is neither detrimental to the environment, the local culture nor the local economy, and whether there is the possibility that the hotel’s certification is undeserved and merely used as a marketing tool.

What led me to these questions was prior hydrologic research conducted near a large certified sustainable hotel in Montverde, a well-known eco-destination in the province of

Puntarenas, Costa Rica. After hearing rumors from locals that El Establo Mountain Hotel was suspected of emitting its sewage without treatment, I set out to test this hypothesis using dragonfly and damselfly larvae as biological indicators. I found evidence that suggests fecal contamination of an adjacent stream, and also a large landfill containing recyclable materials that had appeared to have been burned on the property of the hotel. While this evidence seems to hinder the reliability of Costa Rica's certification system, I sought to delve deeper into the CST to truly gain an understanding of the CST's drawbacks, if any, and possible improvements, such as a more stringent auditing process encompassing output measurements (what's coming out of the hotel in terms of sustainability?) in addition to input measurements (what sustainable procedures is the hotel implementing?).

## **Methodology**

To investigate the reliability of Costa Rica's Certification for Sustainable Tourism, I first researched the history and current processes of the program to fully understand the certification's potential strengths and weaknesses. I then looked at previous literature to learn more about third-party certifications in general and what kinds of studies had been conducted in the past to gauge the effectiveness of the CST. To demonstrate the need for more stringent auditing processes, including hotel output measurements, I presented my personal hydrologic research as a case-study. I then compared Costa Rica's certification program to two other distinctive certification programs, using 13 variables to distinguish pros and cons of each certification scheme. The preceding research allowed me to discuss factors of the CST that contribute to and hinder the program's reliability, and ultimately recommend future procedural improvements to

increase the program's positive impacts, including environmental, economic and societal, and validate the program's credibility.

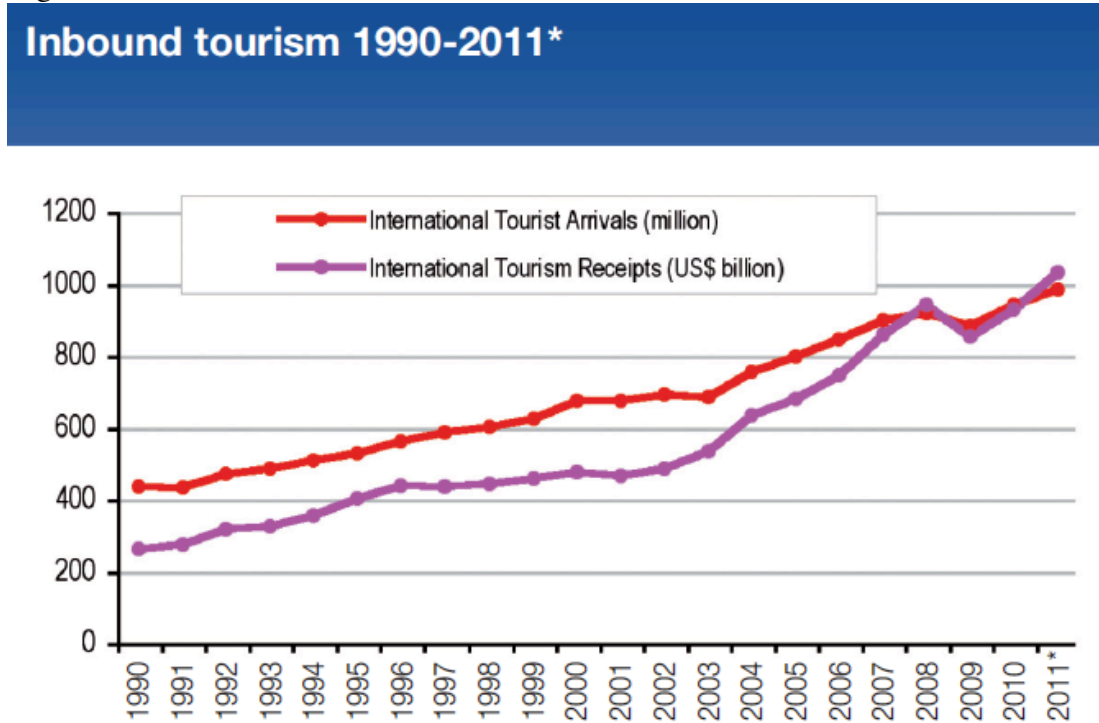
## **Background**

### **Tourism Industry Overview, General Information about Costa Rica**

Tourism, a billion dollar industry, is one of the largest and fastest growing economic sectors in the world (UN WTO 2012 – 1). In fact, international tourist arrivals grew by 4.6 percent from 2010-2011, and total international arrivals are expected to reach one billion in 2012 for the first time in history (Figure 1). These numbers are expected to rise in coming years by 3.3 percent a year in the next 20 years, and arrivals to emerging economies are expected to increase at double the rate (4.4% per year) of arrivals to advanced economies (2.2% per year) (UN WTO 2012 – 1). In Central America alone, international arrivals grew seven percent between January and June 2012 (UN WTO 2012 – 2). A premier Central American ecotourism destination is Costa Rica, a small country of less than 20,000 square miles, comparable to the size of Vermont and New Hampshire combined. The country is known globally for its conservation efforts, with about 26 percent of its land protected and more than five percent of the world's biodiversity safeguarded. In 2010, commerce, tourism and services (including hotels, restaurants, tourist services, banks and insurance) accounted for 67 percent of Costa Rica's gross domestic product, making tourism the country's largest economic driver. The United States accounts for almost half of Costa Rica's imports, exports and tourism, as more than 700,000 American citizens visit the country annually (US Dept. of State 2012).



Figure 1



source: taken from UN World Tourism Organization 2012 Tourism Highlights

## History of Tourism & Ecotourism in Costa Rica

Costa Rica's participation in tourism development began in 1930 with the creation of the first private hotel called "Gran Hotel Costa Rica," though it was promoted by the government. In 1930, the "National Tourism Board" was created by the government as a means to regulate tourism activity, and in 1955 was replaced by the "Instituto Costarricense de Turismo" (ICT), or Costa Rican Tourist Board (ICT 2012). The tourism industry in Costa Rica was relatively small-scale until the late 1980s when ecotourism became a household title associated with the small country. This was largely because of its large number of national parks, biodiversity, democratic

political stability and growing middle class (Honey and Bien 2005). However, the Costa Rican government was unaware of the rising popularity until the late 1990s. For decades, the ICT was only partially aware of the growth of the ecotourism industry and the positioning of the country as a global ecotourism destination (Honey and Bien 2005). Government support has shifted over the years from promoting city tourism in the early 1980s, beach tourism in the late 1980s, golf in the early 1990s, and sustainable conventional tourism most recently in the mid to late 1990s (Honey and Bien 2005).

Though the terms “ecotourism” and “sustainable tourism” are often used synonymously in the literature, it is helpful to distinguish between these two monikers, despite their marginal differences. Ecotourism, the first of the terms to be widely-used, includes an experience with the local ecology and entails concern for the impacts to the natural environment, economic impacts and the socio-cultural impacts to the host country. Sustainable tourism tends to give more consideration to the socio-cultural impacts of tourism than ecotourism does, and is considered an activity that can be practiced by future generations without limitations posed by the actions of the current generation. Another key difference is that sustainable tourism does not necessarily include the facet of an experience with local ecology (LePree 2008-2009). Ecotourism is highlighted in Costa Rica because of its rich biodiversity and tourists’ desires to interact with local flora and fauna, however, sustainable tourism can encompass both ecotourism and city-based tourism. Regardless of their minor differences, both are attractive alternatives to large-scale commercial tourism.

While ecotourism has given nature an economic value, which has contributed to the protection of the country’s forests and biodiversity, not all effects of ecotourism have been positive (Koens et al. 2009). Analysis by Koens and his colleagues revealed that the economic,

environmental and social effects of ecotourism development in Costa Rica are both positive and negative: benefits include improved job opportunities and greater protection of natural areas, though drawbacks include disintegration of local communities and cultures, lack of urban planning and regulation of constructed tourist facilities, and lack of capacity for responsible sewage and waste management (Koens et al. 2009). As Costa Rica's population (which is currently about 4.6 million) and tourism industry continue to grow, resource management is a matter of rising concern, especially in the field of aquifer, river and ocean contamination. Currently, only 3.5 percent of the country's sewage is managed in sewage treatment facilities, and an estimated 50 percent of septic systems function properly (US Dept. of State 2012). So, while Costa Rica is spearheading its conservation efforts, it is lacking in its waste management scheme. To enhance these positive effects of tourism and minimize its negative impacts while protecting Costa Rica's image as an environmentally-minded country, the Costa Rican Tourist Board (ICT) developed the Certification for Sustainable Tourism (CST) in 1997.

### **History of Eco-Certifications/Certifications in Costa Rica**

During the time period of the 1980s and 1990s, the notion of sustainability became an important aspect throughout the tourism industry (LePree 2008-2009). The practice of green washing, the false labeling and marketing of environmentally friendly goods and services, was first implemented during the environmentally conscious period of the 1970s, and in the past few decades, the tourism industry has seen a plethora of certification strategies to counter this deception (LePree 2008-2009). Certification programs, those that assess and assure a business as meeting specific standards, really took flight around the world in the aftermath of the United Nations' 1992 Earth Summit (Honey and Bien 2005). The two-week Earth Summit, formally known as the United Nations Conference on Environment and Development, took place in Rio

de Janeiro, Brazil, where 172 international governments and 2,400 NGOs adopted Agenda 21, “a wide-ranging blue-print for action to achieve sustainable development worldwide” (UN Earth Summit 1992). In 1998, the United Nations Environment Program (UNEP) published the first comprehensive report on tourism ecolabels, titled *Ecolabels in the Tourism Industry* (Font 2002), and in 2000, the first ever international ecotourism and sustainable tourism certification workshop took place in Mohonk, New York, where a framework for certification programs titled *Mohonk Agreement: Proposal for an International Certification Program for Sustainable Tourism and Ecotourism* was drafted (LePree 2008-2009). According to the agreement, “This document contains a set of general principles and elements that should be part of any sound ecotourism and sustainable tourism certification program” (Mohonk Agreement 2000). The agreement was the first to develop an international framework regarding eco and sustainable tourism certification programs, and continues as a guiding principle in their formation (LePree 2008-2009). The UNEP and the World Tourism Organization (WTO) collaborated in 2005 to publish a guide for policy makers titled *Making Tourism More Sustainable* (LePree 2008-2009), which, according to the publication, “defines what sustainability means in tourism, what are the effective approaches for developing strategies and policies for more sustainable tourism, and the tools that would make the policies work on the ground” (UNEP 2005).

Costa Rica began experimenting with sustainable certification in 1989, when a small group of environmentalists, scientists, academics, writers and ecotourism practitioners in Costa Rica began cultivating an eco-rating system. The group developed a “Code of Ethics for Sustainable Tourism” with eight basic principles and in 1991 rated all known tourist lodgings in Costa Rica based on compliance with the code. Though the code was never well known or widely accepted, it was used as a foundation for the first “green-rating” in New Key’s 1992

guidebook. The rating evolved over the years to include input from hotel owners, tour operators, professionals and academics and eventually came to include an extensive survey and on-site inspections. The evolving New Key survey progressed to focus on the three traditional pillars of sustainability (environment, economics, socio-culture), and hotels that passed were listed in the guidebook, receiving one to three suns based on performance. Overtime, however, the survey failed due to insufficient funds, rising popularity of alternative Costa Rican guidebooks, and the fact that the authors of New Key moved away from the country (Honey and Bien 2005).

The creation of the Certification for Sustainable Tourism (CST) was proposed and quickly accepted by ICT officials in the mid-1990s, and in 1997, the first edition of the CST for hotels and lodges was published. The initial set of criteria was based on stakeholder workshops and field-testing. Though stimulated by the New Key survey, the CST did not draw closely from this model, as it sought to widen the scope to include the newer, larger, upscale, urban, and foreign-owned conventional hotels. Creators of the CST felt that in order to maintain Costa Rica as a competitive eco-destination, all types of hotels needed to act responsibly both socially and environmentally. Essentially, the New Key survey covered the ecotourism sector of Costa Rican hotels, while the CST was designed to envelop the practice of sustainable tourism by all hotels (Honey and Bien 2005). The CST is currently voluntary, non-profit, government sponsored, free of charge, performance-based, third-party audited and maintains high credibility outside of Costa Rica (Honey and Bien 2005; Rivera 2004). The certification has recently expanded to include a certification for tour operator agencies (CST 2012), however, for the purposes of this study, only the certification for hotels will be analyzed.

## **Certification for Sustainable Tourism: How does it work?**

Costa Rica's Certification for Sustainable Tourism developed an evaluation questionnaire with performance-based criteria from which all hotels could be measured, using various models from around the globe as a framework. Questions were formulated to be easily answered by hotel managers and on-site auditors (Honey and Bien 2005). The evaluation measures sustainability based on its three pillars: environmental, economic and socio-cultural, and from these, a check-list of yes/no questions in the following categories exists: (1) physical-biological environment; (2) infrastructure and services; (3) external client; and (4) socio-economic environment. These four categories are then divided into 20 general descriptors that represent sources of positive and negative impacts generated by hotels, from which the 153 questions evaluate the hotel's performance (CST 2012). Each of the questions relates to a positive condition of sustainability, and hotels are scored based on what percentage of these conditions are met (CST 2012).

Participation in the CST by lodging establishments is straightforward: hotels must present a one-page registration form and three-page notarized declaration to the sustainability department of the ICT, located in the country's capital city of San Jose (CST 2012). Certification procedures for lodging establishments as listed on the CST's official website are as follows:

(note: procedures have been translated from Spanish to English and may contain minor differences from the original list)

1. The establishment must present registration and affidavit documentation to the headquarters of the Instituto Costarricense de Turismo (ICT), Department of Sustainability.

2. For a month or so, there will be an internal ICT administrative level query to verify that the establishment has not had any previous problems with the ICT and/or with the CCSS (Costa Rican Social Security Institution).
3. An initial site-visit will take place where an auditor will give the establishment an introduction to the CST, where he will explain each of the survey questions/compliance criteria in the survey.
4. About three months after the initial site visit, scheduled in accordance with the establishment, the evaluation team will visit the company for a field evaluation (tour of the establishment, interviews, direct observations, documentary evidence of each of the survey questions and ethnography of the establishment).
5. After the evaluation, the establishment has eight calendar days to submit documentation that was not presented prior to or at the time of evaluation.
6. Using a computerized procedure, the evaluation team will use their results to conduct a preliminary analysis and evaluation of the establishment. This preliminary evaluation is then forwarded via email to the establishment.
7. The establishment has a maximum of eight days to request clarification or attach supporting information.

8. Evaluators will present the final results to the National Accreditation Commission.

9. Following analysis of the results by the National Accreditation Commission, the commission will award (or not award) a level of sustainability to the establishment. The establishment is given the guidelines for use of the CST logo and a summary of the obtained benefits and responsibilities of being certified under the CST.

10. As quickly as possible, the CST will give the company an official certificate for the establishment to display in a visible place.

11. At the end of each year, there is a banquet with the establishments that obtained the Certification for Sustainable Tourism during that year.

Evaluation of the hotel is conducted by an independent branch of the Costa Rica National Accreditation Commission to insure impartiality in scoring (CST 2012; LePree 2008-2009). Auditors from the commission are responsible for conducting an initial site visit to explain the CST process, giving managers a manual containing evaluation guidelines, and reviewing the evaluation questionnaire. Four to eight weeks later, auditors return for a formal assessment, using the check-list and checking “yes” for compliance and “no” for non-compliance beside each question, which are weighted on a scale of importance from one of three. “For example, one question under the physical-biological environment is ‘The hotel has a private reserve’ and a ‘yes’ answer receives 2 points. Another under the socio-economic environment gives three points if at least ‘60% of the hotel’s employees are people from the local community.’” (Honey



and Bien 2005). The total points received in each of the four categories are tallied, a final score is computed for each category, and the lowest score for any category determines the ranking obtained by the hotel. The highest level, level five, is only achieved by scoring higher than 94 percent compliance in every category, while level one requires a minimum of 20 percent compliance (Honey and Bien 2005). Hotels are then rewarded with one to five green leaves based on their certification levels. By using this scoring method, it is expected that hotels will aim to comply with all four categories of the model with equal effort. In this way, a hotel that has an outstanding level of sustainability (level five) in the infrastructure and services category, but scores a one in terms of physical-biological parameters, will receive only one leaf. (LePree 2008-2009). There are currently 191 CST certified hotels, the majority of which have achieved rankings in the middle of the spectrum (Table 1).

Table 1

Certification Level	% Compliance Required	Number of Lodging Establishments (2012)	% of Certified Lodging Establishments (2012)
1	20 - 39	24	12.6
2	40 - 59	47	24.6
3	60 - 79	54	28.3
4	80 - 94	43	22.5
5	> 94	23	12.0

sources: compiled from CST 2012 and Honey and Bien 2005; includes original data from author's research

### **Motivation behind participation: Why do hotels choose to participate in the CST?**

The Certification for Sustainable Tourism poses obvious benefits for Costa Rica as a nation, however, one might ask: What are the benefits to the hotels themselves participating in the CST? Costa Rica is able to conserve its beautiful and diverse ecosystems, employ local

community members and maintain local cultures, but the benefits are less apparent when considering the hotel industry. Most evidently, hotel prices are correlated with higher certified environmental performance (Rivera 2004). In addition, hotels can improve their image, local community relations and reduce environmental liability (UNEP Caribbean). However, for many hotel owners, the certification has not only resulted in a market advantage over competitors, but it can also reduce operating costs in the long-run. For example, hotels can save money by reducing water consumption, energy usage, solid-waste haulage, chemical and maintenance costs, and can have a pay-back period of less than two years (UNEP Caribbean). On the other hand, the costs of complying with a certification program are often cited as a key barrier to implementation, so if hotels are put at an economic disadvantage in this way, they will be less likely to participate (Committee on Certification of Sustainable Products and Services 2010).

### **Potential problems with certifications**

An underlying contradiction of sustainable tourism is just that: Can tourism in itself be considered sustainable? and Is sustainable growth possible? These questions are often asked by critics attempting to understand how the hotel industry can sustain an explosive increase in volume while successfully decreasing the negative impacts of tourism in terms of the environment, economy and socio-cultural composition of Costa Rica (LePree 2008-2009; Honey and Bien 2005). So, while ecotourism and sustainable tourism seem to be admirable methods of protecting nature and conserving resources while creating jobs, the long-term sustainability of these alternative forms of tourism are in constant debate (Dasenbrock, 2002). Further, while airlines, travel agencies, hotels, restaurants and tour-guide companies collect the majority of the revenue provided by ecotourism, these businesses do not always support the protection of

preserves and conservation areas that harbor the diverse flora and fauna that tourists travel from afar to observe (I learned of this information in informal interviews with local preserve and conservation administrators of Monteverde, Costa Rica during my two month visit).

Regardless of sustainable tourism's debated inherent flaws, Costa Rica's Certification for Sustainable Tourism is widely considered to be one of the most successful certification systems in the world and is used as a model template by many other countries developing sustainable certification schemes (Honey and Bien 2005; UNEP Caribbean; Koens et al. 2009; LePree 2008-2009; UNEP & WTO 2005). However, some argue that the certification is too lenient and under regulated, allowing undeserving businesses to advertise themselves as CST certified. For example, large-scale, large-impact hotels can be certified with little effort by merely using biodegradable cleaning products, avoiding pesticide use and being careful of waste management (Dasenbrock 2002). This issue of cheating is at the heart of credibility when it comes to certification, and there are multiple approaches hotels can take to cheat: less-than-stringent standards, non-required monitoring and/or reporting, or simply lying about being certified (Committee on Certification of Sustainable Products and Services 2010).

According to Honey and Bien, 25 years ago, accommodations in Costa Rica were much more raw, and it was easier to believe hotels who claimed running environmentally and/or socially responsible businesses: "Rooms were small, beds were lumpy, baths were shared, water was cold, towels were not provided. Atmosphere was minimum." However, beginning in the 1990s, large international chains moved in, such as Best Western, Marriot, Hilton (US), Barceló and Sol Melia (Spain). Several of the foreign-owned chain hotels have been involved in environmental controversies, such as the Spanish-owned Barceló. When building their first beach hotel at Playa Tambor, the chain allegedly destroyed mangrove trees, burned down the

homes of the residents who refused to be bought out, and ignored coastal regulations. The Costa Rican government believed the hotel to be largely in compliance with the law and the local community received negligible monetary compensation. However, the controversy caused the owners of the hotel to become aware of the necessity of protecting their image. Subsequently, the hotel has since made an effort to comply with the country's Certification for Sustainable tourism, though its certification has created doubt about the legitimacy of the certification program (Honey and Bien 2005).

Maintaining legitimacy is a fundamental goal of any certification scheme. The system must be frequently updated, which costs money. For example, the CST listed four businesses for several years that no longer existed (Honey and Bien 2005). The character and quality of a hotel can change drastically with a change in staff, management or ownership, and small enchanting hotels can become so successful that they expand to the point where they lose their character and even their sustainability, as was the case with El Establo in Monteverde and La Selva Verde in Sarapiquí (Honey and Bien 2005). Unfortunately, certification programs do not necessarily pick up on these dramatic changes. "If certified hotels are given publicity and marketing advantages, but their ratings are not consistently updated, this would be a disservice to the customer, and negatively impacts the reliability of certification," says Honey and Bien. The authors argue that the CST's technical staff is too small to handle all of the hotels, despite the fact that its inspection process has been systematized (Honey and Bien 2005). In navigating the certification's website and reviewing previous literature, I was unable to find information explaining how frequently the CST audits each hotel, and whether the program accepts customer reviews regarding each hotel's sustainability.

A common criticism of Costa Rica's Certification for Sustainable Tourism is that the

program does not give adequate attention to lodging establishments that are involved in land preservation and working to prevent unlawful logging, poaching and other environmental threats. Contrarily, the New Key survey, a predecessor of the CST, required having a private reserve or being closely aligned with a government reserve a prerequisite for being rated. It is these types of establishments that have helped to give Costa Rica its reputation as an environmentally and socially responsible ecotourism destination (Honey and Bien 2005).

## **Literature Review**

While there is a fair amount of literature regarding the environmental, social and economic impacts of ecotourism in Costa Rica and the pros and cons of certification programs, there are few studies that truly evaluate the effectiveness of Costa Rica's Certification for Sustainable Tourism in terms of its underlying principles of sustainability and voluntary engagement. In reviewing previous literature, I was able to find one relevant study that examines the role of third party certification systems in general, and two studies that critically analyze the CST.

### ***Certifiably Sustainable? The Role of Third-Party Certification Systems,*** **Committee on Certification of Sustainable Products and Services**

In 2010, the National Research Council's Committee on Certification of Sustainable Products and Services held a workshop to discuss emerging third-party certification systems, where the committee produced a report titled *Certifiably Sustainable? The Role of Third-Party Certification Systems*. The extensive 145-page document covers a variety of topics ranging from how certification strategies compare to direct government regulation to the optimization of

certification as a tool. I will use the document to highlight information that relates to Costa Rica's Certification for Sustainable Tourism.

The committee begins with a discussion of increasing consumption patterns in the United States and third-party certification systems emerging as a tool to increase the sustainability of industry processes and consumption patterns. Members of the committee contend that to date, scrupulous assessments of these programs have been “few and far between,” and there is little evidence of certification programs' impact on environmental, economic, and public welfare outcomes (Committee on Certification of Sustainable Products and Services 2010).

The committee advocates for certification to be viewed as a tool, or means to an end, to aid in a market transformation from conventional to sustainable production. However, there is a fine line regarding flexibility of certification: it needs to be flexible enough to encourage participation, yet too much flexibility, thus accommodating weak performers, “can potentially undermine the entire program.” The committee notes that voluntary standards will not always evolve into regulatory requirements, but as the market for sustainable products grows, it will become increasingly necessary to discriminate non-compliant parties through either direct regulation or market forces (Committee on Certification of Sustainable Products and Services 2010).

The next section of the document considers how certification schemes can be used as a tool and how they compare to direct government regulation. To summarize, certification programs are used as a new tool to engage market forces in endorsing environmentally and socially sustainable objectives and improving industry performance and accountability. Regarding government regulation, standards are usually aimed at problems of public concern and

are placed within a framework of legislative policies and goals, compliance is mandatory and noncompliance is subject to penalization. This form of governmental action is likely to produce maximum legitimacy and credibility, however, the process of developing and amending such regulations is cumbersome and requires extensive research. On the other hand, voluntary programs do not have the authority to make noncompliant businesses either comply or disappear. Instead, these programs rely on market forces to convey this authority, but without strong consumer demand for certified products, noncompliance will not merit a disadvantage for businesses (Committee on Certification of Sustainable Products and Services 2010).

Next, the topics of developing standards and implementing those standards is presented. Some primary concerns workshop participants pinpointed when considering standard development were stakeholder agreement, flexibility and credibility of the standards, implementation obstacles, compliance costs, and to a lesser degree, third-party audits. A major criticism of existing certification programs is that standards are often set without considerable input from various stakeholders. On the other hand, this claim is often refuted by the argument that including a large group of stakeholders could lead to a high degree of disagreement, resulting in less-stringent consensus based goals. “Global” programs must be implemented and adopted locally, as meta-standards may not necessarily reflect the needs and ambitions of locals. To achieve this, multistakeholder partnerships should be kindled to properly address the problems at hand, reduce vulnerability to competing efforts, ensure future improvements and guarantee long-term success (Committee on Certification of Sustainable Products and Services 2010).

The committee goes on to discuss the fact that many certification programs are based on weak theories, and that when developing these programs, stakeholders must make crucial

assumptions about the impacts and outputs of a standard, if implemented, and the long-term outcomes. Members emphasized that standard setting is often a political process that at best is informed by science rather than driven by scientific knowledge. Several workshop participants commented that science is often useful in setting the “gold” standard for top performers, but that there are a number of trade-offs between a program designed to select from the top and a program designed to improve participant performance at the bottom. According to the committee, credibility means something different to different stakeholders, but general themes include:

- (1) “Is the label meaningful? What value differentiation is a business attempting to communicate with a particular label?”
- (2) “Is the label consistent? Does it mean different things if applied to different produces, and if so, are there appropriate disclaimers?”
- (3) “Is the label verified? There may be disagreements on the role of a “third party” (i.e., independently creating the standard vs. certifying and auditing a multistakeholder standard) but in general, credibility will depend on having a neutral body verify the process before awarding a certification.”

Workshop participants contend that compliance costs are often the most prominent barrier to widespread implementation, since business are only likely to participate if their perceived benefits outweigh costs to put them at an economic advantage, either in the short or long-run. According to participants, financing appears to be necessary for both the accreditation/certification process, and for business owners to help them to upgrade their performance and compliance. “The original hope for certification schemes was that market



forces would favor those producers willing to improve their performance, but experience has shown that the existing market is not sufficient to drive this transformation.” In regards to the client, although consumers may be exhibiting greater awareness and interest of issues related to sustainability, some committee members affirm that price and convenience remain the driving factors of consumption decisions. This poses problems for businesses owners, as a primary concern is whether their certified product will sell (Committee on Certification of Sustainable Products and Services 2010).

An overarching question with any certification system is how to measure success. This appears to be a major deficiency of such systems, according to the committee. In the absence of rigorous analysis of what works, what doesn't, and why, it is unlikely that voluntary certification systems will become widely adopted in the future and truly transform markets. Workshop participants noted a need for improvements in the baselines for measurement, the impacts measured, and the scale at which programs are analyzed. Examining past experiences can also reveal positive and negative effects of certification. Regardless if standards are considered rigorous with a scientific basis, certification programs rely heavily on the belief that by changing certain practices, outputs will become more sustainable. However, programs seldom perform baseline assessments against which they could measure improvements in performance. Data collection and additional accounting (and therefore additional costs) is proposed as a reason for the absence of such assessments (Committee on Certification of Sustainable Products and Services 2010).

Though certification programs often include performance indicators, committee members comment that these indicators merely focus on management performance rather than environmental and social outcomes. Participants suggest the need for more standards that

measure these impacts, though they acknowledge that this would pose methodological hurdles, such as data availability, the difficulty of making the right comparisons (to uncertified businesses, for example), and the costs of gathering expansive, long-term datasets (Committee on Certification of Sustainable Products and Services 2010).

The committee agrees that most programs focus on process changes and thus merely encourage compliance rather than innovation. The positive aspect of encouraging compliance is that business owners are given a framework for improving their practices, however, set standards could also lock owners into a set paradigm, thereby hindering innovation. To combat this concern, certification programs could provide incentives for exceeding standards by truly rewarding innovative participants (Committee on Certification of Sustainable Products and Services 2010).

Many members of the committee agreed that there is a lack of peer-reviewed, analytical literature on certification programs, specifically with regard to their impacts. One reason proposed to explain this phenomenon was the idea that programs are often implemented by people who care deeply about the program and desire for it to succeed. These people may find it hard to face facts about what works and what does not. One workshop participant shared an experience of conducting a peer-reviewed analysis of a new program, so the organization could gauge how effectively its investments were at promoting more sustainable outcomes in its sector. His analysis revealed that the program was not achieving its desired results and was possibly even counterproductive, despite spending over \$100 million to achieve positive results. This was difficult information for the organization to accept, but it allowed it to make wiser investments in the future (Committee on Certification of Sustainable Products and Services 2010).

For the most part, certification schemes have been pass/fail systems, as noted by the

committee. Members discussed tiered approaches, such as the LEED standard for green buildings, where there is a performance baseline with ascending levels of compliance (for the LEED standard, there are four tiers consisting of baseline certified, silver, gold and platinum). These approaches can provide a pathway to sustainability where there is widespread feasibility at the bottom to encourage participation by as many as possible, while leaving room for improvement at the top. However, workshop participants stressed that the tiered approach has not been successful in providing motivation or guidance to weak performers, despite the idea that tiers will offer more incentives at the bottom of the market. An image used to describe this idea was that of a ladder being yanked upwards: poor performers could climb onto the bottom rung and would have the ability to ascend with program guidance, while having the ability to climb as the standards were occasionally raised. Members agreed that “this may be a more effective way to raise both the bar and the floor for performance in a sector” (Committee on Certification of Sustainable Products and Services 2010).

In conclusion, the Committee on Certification of Sustainable Products and Services is advocating for further research regarding the effects of certification programs on environmental and social quality, as research could be useful in developing more meaningful metrics and benchmarks within a sector and across sectors. The committee insists that standards be developed with set goals and that they be based on tested scientific knowledge rather than theories of change. Rather than scaling up their *efforts*, certification systems must encourage participants to scale up their *intended impacts*. Since certification programs could play a role in market transformation, mainstreaming sustainable production into industry standards could be a goal of such programs. However, according to workshop participants, more work is needed to

understand how to build consumer preference for sustainable good and services (Committee on Certification of Sustainable Products and Services 2010).

### ***Certifying Sustainability: The Efficacy of Costa Rica's Certification for Sustainable Tourism, J.G. LePree***

In a critique of Costa Rica's Certification for Sustainable Tourism (CST) Program, LePree (2008-2009) argues that while the CST is a suitable starting point for certification, there are many structural inadequacies that must be addressed for the program to better align with the fundamental principles of sustainable tourism. He uses the program's four major areas of tourism impact (physical-biological parameters, infrastructure and services, the external client, and the socio-economic environment) as a frame of reference, while analyzing policy documents from the Costa Rican Tourism Institute, The World Tourism Organization, United Nations Environment Programme and the Rainforest Alliance, as well as scholarly research regarding sustainable tourism. The goal of his analysis was to discover whether or not Costa Rica's CST program encompasses what these documents assert to be the most significant principles of sustainable tourism, if the CST is able to promote a tourism that encompasses industry and sustainability as one entity, and in what areas of the certification do the criteria need to be adjusted in order to achieve the overarching objectives of sustainable tourism.

Physical-Biological Parameters: LePree notes that 90 percent of the greenhouse gas emissions produced by the tourism industry result from transportation emissions, which creates a striking contradiction between tourism and sustainability. LePree draws upon the "ecological footprint" (EF) framework developed by Rees and Wackernagel, whereby the amount of biologically productive land and sea required to sustain one's consumption

is quantified. Wackernagel and colleagues calculated the EF score for a two-week vacation in Costa Rica, flying from Miami, and found that the average American tourist had less of an impact on the environment by traveling to Costa Rica than they would have if they had stayed home. This is because they assumed that the tourists would be living like the Costa Rican locals, rather than as an American consumer (Wackernagel et al. 2006). This study implies that the environmental impacts of tourism are largely dependent on the consumptive practices of the tourists themselves. In addition to decreasing consumptive practices, LePree argues that tourism and conservation are undeniably linked, as tourists travel to Costa Rica to observe its lush biodiversity and beauty. However, he poses the question: Does the use of conservation areas by tourists have a negative effect on the environment (thus contradicting the foundation of sustainable tourism)? To answer this question, LePree turns to Weinberg, Bellows and Ekster's study of sustainable tourism in Monteverde. The researchers found that problems with waste and water increase with increasing tourism, that there exists more contamination in small rivers than before, and that the industry is growing so rapidly that small-scale ecotourism could turn to a form of mass tourism in the future (Weinberg et al. 2006). LePree then looks at Farrell and Marion's study (2002) of the impacts of ecotourism on protected land, where it was found that ecotourism can severely affect soil stability, vegetation cover, tree health and wildlife. He finally reviews a study done by Cottrell et al. (2004), which showed that tourists were tremendously aware of these negative consequences of tourism. Subsequently, LePree proposes that there is an "apparent disconnect between tourists' actions and their perceptions." He acknowledges that the scoring criteria of the CST includes a good number of items pertaining to

ecological byproducts of hotel management and to the education of clients on sustainability practices, however, he notes that it remains unclear whether these criteria translate into sustainable practices.

Infrastructure and Services: Costa Rica's infrastructure, according to LePree and the majority of

tourists who visit the country, is in need of strict upgrades in many sectors including "roads, water services, waste management, and a lack of public servants such as police and emergency medical workers" (LePree 2008-2009). LePree argues that with the growth of local and tourist populations, it is imperative that Costa Rica expand and improve its infrastructure in order to follow a model of sustainability. On the other hand, LePree addresses the problem of increased transportation infrastructure: paved roads allow for increased access to ecosystems that were previously difficult to enter.

Weinberg and his colleagues predict that the paving of the roads will change the industry from a sustainable one to one of mass tourism (Weinberg et al. 2006). LePree contends that while the CST requires hotels to enable the local community in various ways, it appears to disregard the problem of "civil society building and empowering local people to have political control of the community" (LePree 2008-2009). An example from Weinberg et al. is Monteverde's inability to have their own municipality status. The town is currently a district in the province of Puntarenas, and the ineptitude of the Puntarenas government has led to little urban planning, allowing businesses to build on unfit land next to streams, where responsible waste disposal is not enforced and they are free to dispose of their waste however they see fit (Weinberg et al. 2006). LePree ends by noting that "If the absence of local governance structures inhibits communities from

influencing the development of their lands and the structure of their local economy, sustainable tourism cannot be a possibility.”

External Clients: Ten percent of the questions on the CST survey concern the education that the client receives from the business regarding sustainability. LePree notes that while the World Tourism Organization’s definition of sustainable tourism includes this client awareness of sustainability, the Mohonk agreement of 2000 does not. He goes on to investigate Jamal et al.’s definition of ecotourism, which includes the need to give the traveler an awareness of and a knowledge of the importance of nature. However, LePree agrees with Gossling’s theory, which states that this notion of nature is “commercialized and commoditized.” According to LePree, if these counterfeit notions of nature continue to dictate ecotourism, then tourists “will continue to be sent the wrong message concerning the meaning of their experience and its incorporation of local culture, all the while missing the more spiritual and interpretive educational experience that should strive to be the focus of a sustainable tourism product” (LePree 2008-2009).

Social and Cultural Impacts: In recent years, sustainable tourism has expanded to encompass a greater anthropocentric vision of sustainability in addition to the common biocentric view that places emphasis on the physical environment (LePree 2008-2009). This shift allows for more focus on the effect that tourism has on the social and cultural structure of local populations. According to LePree, “one of the most widely held criticisms of tourism’s social effects is the commoditization of the host culture” (LePree 2008-2009). According to observations of previous researchers Margaret Swain and

Dean MacCannell, a culture that markets itself as a profitable cultural attraction is no longer able to evolve naturally. LePree believes that this concept should be considered when developing a certification system for sustainable tourism. He comments that the Mohonk Agreement suggests “minimal impact on and presentation of local culture” to be considered, but that the phrase “minimal impact” did not make the cut into the agreement’s abridged set of criteria for sustainable tourism. LePree argues that while the CST program follows this guideline, it encourages the commoditization of local culture rather than encouraging minimal impact on the local culture. To demonstrate this, he pulled two criterion from the CST that state “The hotel publicizes and promotes cultural activities and expressions” and “The promotion of the hotel integrates cultural elements from the local region and communities.” LePree worries that using culture as a marketable good will promote cultural homogenization and weaken “one of the foundations of their successful tourism industry.” He finds that it is more advantageous, as stated above, to put the power back into the hands of local, native stake holders when framing these sustainability policies. LePree then addresses the issues of gender equity and female empowerment, as females have historically been assigned objectified, “submissive domestic roles” in Costa Rican culture. He argues that this inequity can be amplified in the presence of the tourism industry, as it is often maintained within industry’s cultural commoditization practices and labor structure. On the other hand, LePree notes that the tourism industry can also empower females if they are able to contribute to household income, financial decisions and overall greater independence. LePree mentions that the CST has only one gender related item on its survey: “The hotel has established practical actions against sexual harassment and promotes equal



opportunity for both genders.” He contends that in order to properly address the issue of gender inequity, the CST must include more than one item among its extensive criteria (LePree 2008-2009).

Economic Impacts: As a result of the capital and power that large multinational companies possess compared to local businesses, an estimated 50 percent or more of tourism revenue “is never seen in the destination country.” However, despite this information, LePree argues that the CST does a commendable job of including many items in their criteria regarding the economic impacts of tourism. He notes that the CST mandates that at least 60 percent of employees are local residents, that the administration of the hotel are Costa Rican and that employees are well trained and educated, thus building social capital and increasing the likelihood of advancement in the workplace. On a larger scale, the CST encourages hotels to buy local materials, thereby maintaining wealth within the country (LePree 2008-2009).

Using the Certification for Sustainable Tourism’s four major areas of tourism impact, LePree was able to investigate whether the program’s specific criterion truly achieve the overarching principles of sustainable tourism. He ultimately suggests that the CST successfully infuses the tourism industry with these principles, but that there are many inadequacies that should be tackled in order to further infuse the notions of sustainable tourism with the principles of the CST.

## ***Institutional Pressures and Voluntary Environmental Behavior in Developing Countries: Evidence from the Costa Rican Hotel Industry, J. Rivera***

In an attempt to better understand the motivations behind hotel participation in voluntary environmental programs and the effectiveness of those initiatives, Rivera reviewed the Certification for Sustainable Tourism. In his study, Rivera seeks to analyze how institutional factors are related to both participation and performance in the CST, whether the fact that the program is voluntary results in “beyond compliance” performance, and if foreign owned hotels perform differently than locally owned hotels. He first examines various literature regarding neo-institutional theories (DiMaggio and Powell 1991; Scott 1995; Meyer and Rowan 1977) that propose that “external norms, values and traditions that provide a sense of social legitimacy to organizations also influence their management choices and practices,” as social legitimacy is perceived as a key factor in establishing a business’s long-term success. Therefore, according to this theory, a hotel’s participation in a voluntary environmental program is motivated by not only financial considerations, but also by the desire to achieve “socially constructed environmental legitimacy” (Rivera 2004).

Drawing from the neo-institutional theory and previous literature, Rivera hypothesizes that government monitoring, industry association membership, facility size and foreign owned and multinational subsidiary facilities are each positively correlated with participation and beyond-compliance performance in voluntary environmental programs. To test these hypotheses, Rivera administered in-person survey interviews with top managers of 164 hotels, including all 52 hotels that had been audited and certified by the CST program as of December 2000. He then performed regression analyses to identify variables significantly related to participation and performance.

As predicted, Rivera's results suggest that increased governmental monitoring, trade association membership and larger hotels were each correlated with a higher probability of participation in the CST. However, foreign-owned or multinational hotels did not statistically differ from locally owned ones. Rivera offered various explanations for this lack of disparity: First, managers of foreign-owned or multinational facilities have greater access to information and could be more aware of the program's implementation costs than local hotel managers; Second, foreign or multinational hotel managers may prefer to adopt international standards rather than Costa Rica's standards; Lastly, foreign or multinational hotels may have more resources than local hotels to avert institutional pressures to display their environmental mentality. In regards to environmental performance, government monitoring was associated with beyond-compliance performance. On the other hand, hotel size bore no correlation to performance, which is surprising given that "the largest facilities are known to enjoy economies of scale in the adoption of superior environmental management practices" (Rivera 2004). In addition, foreign-owned and multinational hotels did not exhibit a significant relationship to greater environmental performance. Rivera theorizes that these hotels may display lower compliance because they are merely participating to improve their green reputation, not their environmental performance. He concludes that the CST program may not work effectively, despite its correlation with market incentives, performance-based standards and third-party verification. Rivera suggests that institutional pressures could be necessary conditions for improving the effectiveness of the CST.

## **Conclusions from the Literature Review**

While LePree and Rivera's studies measure the effectiveness of the CST in terms of hotel inputs (certification standards, compliance statistics, etc.), neither measures the actual outputs of

any one hotel to determine if extensive criteria, third-party verification and auditing are contributing to a healthier environment and happier community. As the Committee on Certification of Sustainable Products and Services suggested, there is a need for certification programs to include measurements of environmental and social outcomes in addition to merely focusing on management performance. Measuring impacts using a scientific basis will ensure that by improving their practices, hotels' outputs are actually becoming more sustainable. Since this has not taken place in the past, there is little quantifiable evidence regarding the CST's ability to promote sustainable change. Measurements could include those of improved waste diversion from the landfill, presence of biodiversity on hotel property, nearby stream quality, decreased kilowatt usage, anonymous worker happiness indices, economic impacts to the local community and many more. In the next section, I demonstrate how a case-study regarding just one of the above proposed measurements can be used to improve and advance Costa Rica's Certification for Sustainable Tourism.

## **Case Study: El Establo Mountain Resort**

### **Overview**

The Monteverde region of Costa Rica has been a hotspot for ecotourism in the last two decades and currently houses eight CST certified establishments (CST 2012). This region is situated in the Northwestern part of Costa Rica on the Tilaran Mountain Range surrounding the continental divide, with altitude varying from about 600 to 1,842 meters (Koens et al. 2009). Monteverde is home to a large tropical montane cloud forest, which covers the majority of the region. It is also home to three large protected areas – the Monteverde Cloud Forest Preserve (founded in 1972), The Children's Eternal Rainforest (founded in 1986), and the Santa Elena

Reserve (founded in 1992).

In summer 2012, I conducted a study regarding the largest certified sustainable hotel in Monteverde, El Establo Mountain Resort. The hotel has 155 rooms, two indoor heated swimming pools, spa, gym, tennis, basketball and soccer courts, two restaurants, bar and conference center. On its website homepage, the hotel asserts its dedication to sustainability, stating “We have a serious commitment with the environment and promote sustainable and responsible practices that insure the minimum impact to our most valuable resource... ‘Nature’” (El Establo 2012). The CST website, which promotes all certified hotels in Costa Rica, describes the hotel as having “more than 80 percent of its property covered with plants and forest,” “three water treatment plants,” “energy resources managed by a highly efficient computerized system,” training campaigns to employees and neighbors about the proper handling of resources” and “a rigorous code of good environmental practices in all service areas” (CST 2012). El Establo is currently certified with one leaf, meaning that it meets the minimum criteria of at least 20 percent compliance as specified by the CST.

To test whether the hotel’s sustainable inputs were producing sustainable outputs, I conducted a two week study of stream quality along the perimeter of the hotel property. I found evidence that suggests that the hotel may be emitting its black-water into a stream on its property edge, and observed a sizeable landfill on the hotel property containing recyclable materials that appeared to have been burned. The details of my study are as follows:

## **Introduction to Case Study**

In mountainous areas, combinations of climate, geology, hydrology and vegetation shape watershed landscapes, which, if healthy, provide water, food and habitat for plants, animals and humans (US EPA 2012). Communities often have large impacts on watersheds, as humans have

historically lived-near waterways and have used them to dispose of society's waste (Carpenter et al. 1998). These inputs into waterways can originate either from point or nonpoint sources. Point sources are attributed to one source, such as an effluent sewage pipe, while nonpoint sources arise from a multitude of activities that span across a landscape. Consequently, nonpoint sources are harder to detect, and are therefore harder to manage and regulate (Carpenter et al. 1998).

Water pollution is on the rise globally, most evidently in the developing world. More than 80 percent of sewage in developing countries is discharged without treatment (UN WWAP 2012), and every year, more people die from unsafe drinking water than from all forms of violence, including war (UN WLD 2012). As water quality is a growing concern in tropical developing countries, measuring this quality will become increasingly important. Most often, physical parameters of water samples are compared with water quality standards (UN WLD 2012), however, biological indicators can also serve as tools for monitoring water quality and watershed health (Smith et al. 2006).

Macroinvertebrates are being increasingly used to rapidly monitor changing river quality. Among these are the Odonata (dragonflies and damselflies), which are sensitive to varying water conditions and can therefore help in assessing degrees of contamination in waterways (Smith et al. 2006). Since Odonates are abundant and well studied in the tropics, this allows the taxon to be more easily used for assessments (Smith et al. 2006). In Monteverde, there exist over 270 species of Odonata in 14 families (Haber and Wagner 2011). Environmental disturbances, such as inputs of pollution, can alter Odonate assemblages in terms of both abundance and species composition (Clark and Samways 1996).

This study tests physical and biological parameters of a tropical stream to determine the quality of its water from its headwaters to the region where it enters an urban environment. The

stream runs along the perimeter of El Establo Mountain Resort, the largest hotel in its area and a certified sustainable hotel. The hotel was suspected of occasionally emitting its black-water into the Quebrada Sin Nombre. To test this hypothesis proposed by local community members of Monteverde, I repeatedly sampled the stream at three sites.

## **Methods**

### ***Study Site***

This study was done at three sites along a typical tropical mountain stream called the “Quebrada Sin Nombre” (“No Name Stream”) in Monteverde, Costa Rica (10.3° N). Sites were chosen based on relation to suspected anthropocentric pollution: (Site 1) high elevation near the headwaters, distinctly above the influence of human establishments, with low stream discharge, average depth of about 0.3 m (1 ft) and elevation ranging from 1557-1550 m; (Site 2) mid-elevation on the property edge of a large-scale resort hotel (El Establo), with low stream discharge, average depth of about 0.3 m (1 ft) and elevation ranging from 1473-1470 m; (Site 3) lower-elevation urban environment on the property edge of establishments including a large restaurant (Johnny’s Pizzeria) and many homesteads, with greater stream discharge than the prior two sites, average depth of about 0.46 m (1.5 ft) and elevation ranging from 1413-1405 m. There was no noticeable algae presence at Sites 1 and 3, however, both brown and green algae were present in puddles 11-15 at Site 2. Above Site 2, a large pipe was observed projecting over the stream gulley from a building of El Establo. Additionally, a large landfill was observed on the property edge of the hotel, the debris of which had been burned. At Site 3, considerable amounts of litter were consistently observed in the stream, and foam from household detergents was observed on one sample day. Because sampling was done during a dry period of the rainy

season, the stream often disappeared and reappeared prior to Site 3, where there was a consistent, more fluent stream (Figure 2).



Figure 2: (A) Landfill on El Establo hotel property. Close observations reveal the presence of numerous recyclable materials and charring as a result of fire. (B) View of Site 2 directly below the Hotel Establo. This was the typical scenery of both the headwaters site (Site 1) and Site 2, characterized by abundant vegetation and a low-flow stream consisting of a network of shallow puddles. (C) An inconspicuous pipe projecting over the stream gulley from El Establo. Photo was taken from the stream and was magnified to highlight the pipe. (D) Foam from detergents protruding from a household effluent pipe at Site 3. This urban site was characterized by a continuous, relatively high flow rate stream.



### ***Data Collection – Stream Parameters***

Each site consisted of a 120-meter transect along the stream, with 10 sampling “puddles” chosen within each transect. Since no actual puddles existed at Site 3 due to its higher discharge and velocity, 10 small inlets of slow-moving water on the bank of the stream were selected and labeled as puddles. Thirty puddles were sampled six days over a 10-day period from July 21 – 31, 2012, using the following measurements: (1) dissolved oxygen concentration (ppm), using an Oakton portable waterproof dissolved oxygen meter (2) pH, using an EcoTestr pH 2 waterproof pocket tester (3) water temperature (°C), using a standard digital thermometer (4) nitrate ( $\text{NO}_3$ ) concentration (ppm) and (5) phosphate ( $\text{PO}_4$ ) concentration (ppm), both using a LaMotte Smart 2 Colorimeter Water Quality Analyzer. For the nitrate and phosphate concentrations, only one measurement was taken each day from a representative sample derived from the 10 puddles in each site. To achieve a representative sample, 5 ml of water were taken from each of the 10 puddles and put into a container, and after mixing the samples, a subsample of each mixture was used to test for nitrate and phosphate concentrations at each site, rather than at each puddle.

### ***Data Collection – Odonate Larvae***

Odonate larvae were collected on the final day of the 10-day sampling period. Each of the 30 puddles was sampled by the same two people for five minutes each. The method of collection included individually scooping puddle substrate into a colander and sifting through the colander for larvae. Each larva found was placed in a container and taken to Odonate specialist Bill Haber, Ph.D, for further identification. Number of larvae and the genera (and species when possible) of the various larvae were recorded for each puddle.

## Results

### *Physical Stream Parameters*

There were significant differences in mean values of dissolved oxygen, pH, water temperature, nitrate and phosphate concentrations at the three sites. I ran randomized block ANOVAs, with sample days as blocks, to test the effects of site on DO, pH, temperature. I then ran post hoc tests to determine which of the sites were statistically significantly different from one another in terms of DO, pH and temperature. For DO, concentrations at Site 2 (below hotel) were significantly lower than at sites 1 (headwaters) and 3 (urban), which were statistically similar. In addition, high DO variation existed within Site 2 (Figure 3). There were also significant trends for pH (note: pH values were converted from pH to the negative log of the hydrogen ion concentration in mol/l for statistical analysis). pH levels remained neutral to slightly basic at Site 1/puddles 1-10 (mean = 7.29), acidic to neutral at Site 2/puddles 11-20 (mean = 6.81) and slightly basic at Site 3/puddles 21-30 (mean = 7.92). pH values at Site 2 were statistically significantly different from those at Sites 1 and 3, which were statistically similar. As was the case for DO, high pH variation existed within Site 2 (Figure 5). Temperature variation showed a trend in which water temperatures significantly increased from the natural high elevation to urban low elevation site (Figure 3). To test whether my samples sites were statistically significantly different from one another in terms of nitrate and phosphate concentrations, I ran Kruskal-Wallis ANOVAs. Samples from the three sites were statistically significantly different from one another in terms of both nitrate and phosphate. Both were greatest at Site 1, yet nitrate was lowest at Site 2 and phosphate was lowest at Site 3 (Figure 6).

## **Odonate Populations**

I ran a randomized block ANOVA to test the effect of site on Odonate populations. I found that Sites 2 and 3 significantly differed from Site 1 in terms of Odonate abundance. A total of 56 Odonate larvae were collected belonging to three genera. Fifty-two of 56 individuals were found at Site 1, while only one individual was found at Site 2 and three individuals at Site 3. Site 1 contained not only the most abundant Odonates, but also the most diverse make-up of genera. The more pristine environment of Site 1 harbored three genera: *Epigomphus* (Gomphidae), *Argia* (Coenagrionidae) and *Brechmorhoga* (Libellulidae), with site 2 harboring one genus (*Argia*) and site 3 harboring two genera (*Epigomphus* and *Argia*). *Epigomphus* was composed of two species, *Epigomphus suboptusus* and one which is new to science. I was unable to determine species level for the other two genera. (Figures 7 and 8).

## **Discussion**

### **Overview**

Significant differences in mean values of dissolved oxygen, pH, water temperature, nitrate, phosphate and Odonate populations at the three sites indicate that different processes are at play at different locations along the Quebrada Sin Nombre. High DO, nearly neutral pH values and a high abundance of Odonate larvae at Site 1 (headwaters) suggest a healthy stream. Conversely, low DO, more acidic pH values and a very low abundance of Odonate larvae at Site 2 (below hotel) suggest a less healthy stream. Site 3 (urban) rendered high DO concentrations and slightly basic pH values statistically similar to those at Site 1, however, this site contained a low abundance of Odonate larvae, suggesting a less pristine environment than Site 1. Nitrate and phosphate concentrations varied among the sites and their effects on stream quality were indeterminable.

## Dissolved Oxygen

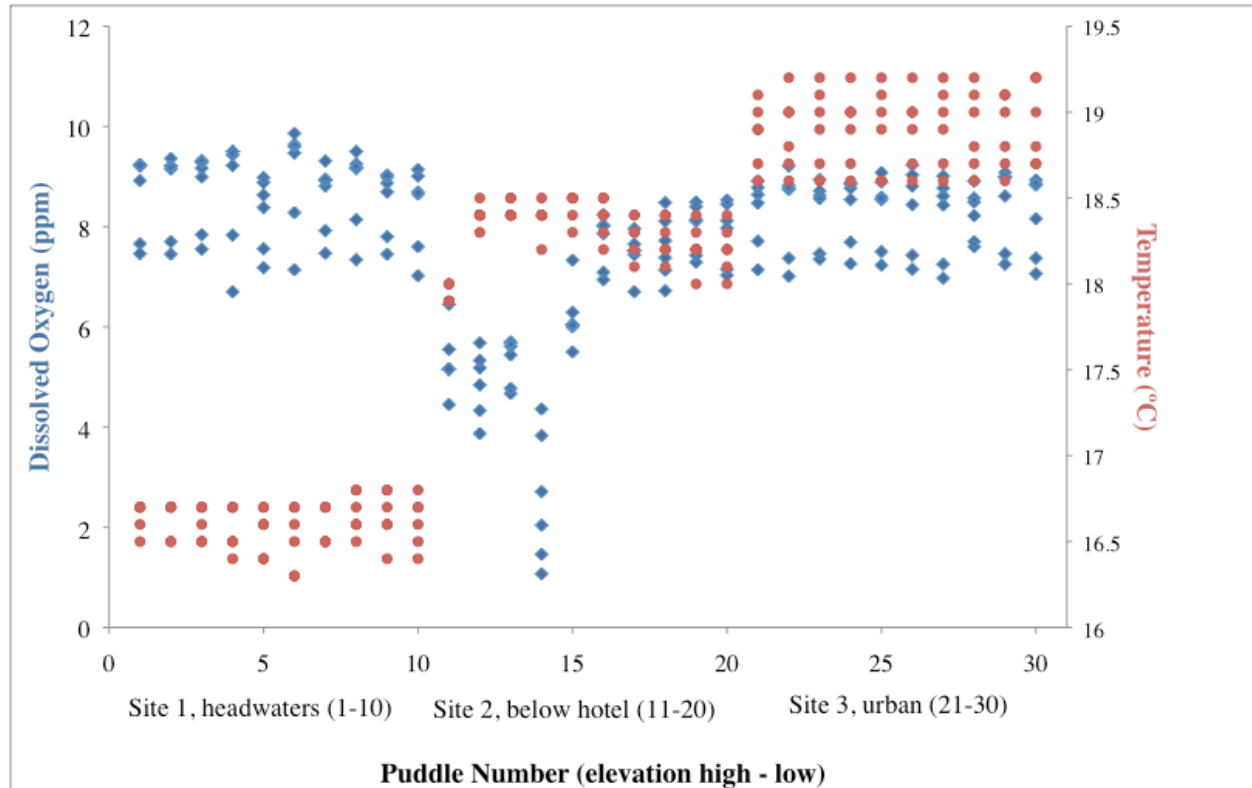


Figure 3: Dissolved oxygen and temperature variation among 30 puddles at three sites along a stream in Monteverde, Costa Rica. Site location had a statistically significant effect on both DO concentrations and temperature (DO: randomized block ANOVA,  $F = 83.33$ ,  $p < 0.0001$ ,  $df = 179$ ; Temp: randomized block ANOVA,  $F = 4581.32$ ,  $p < 0.0001$ ,  $df = 179$ ). Post hoc tests showed that DO concentrations at Site 2 (below hotel) were significantly lower than at Sites 1 (headwaters) and 3 (urban), which were statistically similar (Tukey-test,  $q = 2.36$ ,  $p < 0.0001$ ); and that temperatures were significantly different from one another at each site (Tukey-test,  $q = 2.36$ ,  $p < 0.0001$ ). At Site 2, puddles 11-15 showed large drops in dissolved oxygen, though puddles 16-20 consistently had higher DO concentrations despite similar temperatures.

According to Henry's Law, the solubility of gas is equal to Henry's Law Constant multiplied by the pressure of the gas, where Henry's constant is unique to each gas solvent pair and is temperature dependent (Shapley 2011). Applied to dissolved oxygen, the solubility of oxygen in water is affected by both the temperature of the water and partial pressure (the

pressure a gas would have if it alone occupied a volume) over the water. For temperature, oxygen is more easily dissolved in cold water than in warm water. Greater air pressure results in higher partial pressure of oxygen, so water at sea level can dissolve slightly more oxygen than mountain streams at the same temperature (Senese 2010). Using this concept, it could be argued that either (1) dissolved oxygen was greatest at the headwaters of the Quebrada Sin Nombre due to its higher elevation and therefore cooler average temperatures, or (2) dissolved oxygen should have been greatest at the urban site due to its lower elevation and therefore greater air pressure. I contend that dissolved oxygen trends at the three sites cannot be exclusively explained using Henry's Law and that other factors are at play.

By examining the table below (Table 2), you can observe the "Calculated Expected DO Concentration" for each site using each site's elevation and average sampled water temperature. This calculation assumes that pressure and temperature are the only factors contributing to DO, resulting in concentrations of 8.91, 7.98 and 7.95 ppm respectively for Sites 1, 2 and 3. Comparing these values with those of "Average Sampled DO Concentration" demonstrates that DO concentrations in the Quebrada Sin Nombre are affected by more factors than simply pressure and temperature. While average sampled DO concentrations at Sites 2 and 3 both differ from their expected values by 0.3 ppm, Site 2 differs by 1.7 ppm. When looking at minimum sampled DO concentrations, Sites 1 and 3 differ from expected values by 1.89 and 0.94 ppm respectively, while Site 2 differs by an alarming 6.91 ppm. Possible explanations for these discrepancies are presented below.

Table 2

	<b>Site 1 (headwaters)</b>	<b>Site 2 (below hotel)</b>	<b>Site 3 (urban)</b>
<b>Minimum Site Elevation (m)</b>	1550	1470	1405
<b>Standard Barometric Pressure at Specified Elevation (kPa/mmHg)</b>	85 / 673	86 / 643	86 / 648
<b>Percentage of Oxygen Available at Sea Level</b>	85%	86%	86%
<b>Average Water Temperature (°C)</b>	16.1	18.3	18.9
<b>Calculated Expected DO Concentration (ppm)</b>	8.91	7.98	7.95
<b>Average Sampled DO Concentration (ppm)</b>	8.61	6.28	8.29
<b>Minimum Sampled DO Concentration (ppm)</b>	7.02	1.07	7.01
<b>Maximum Sampled DO Concentration (ppm)</b>	9.86	8.53	9.23

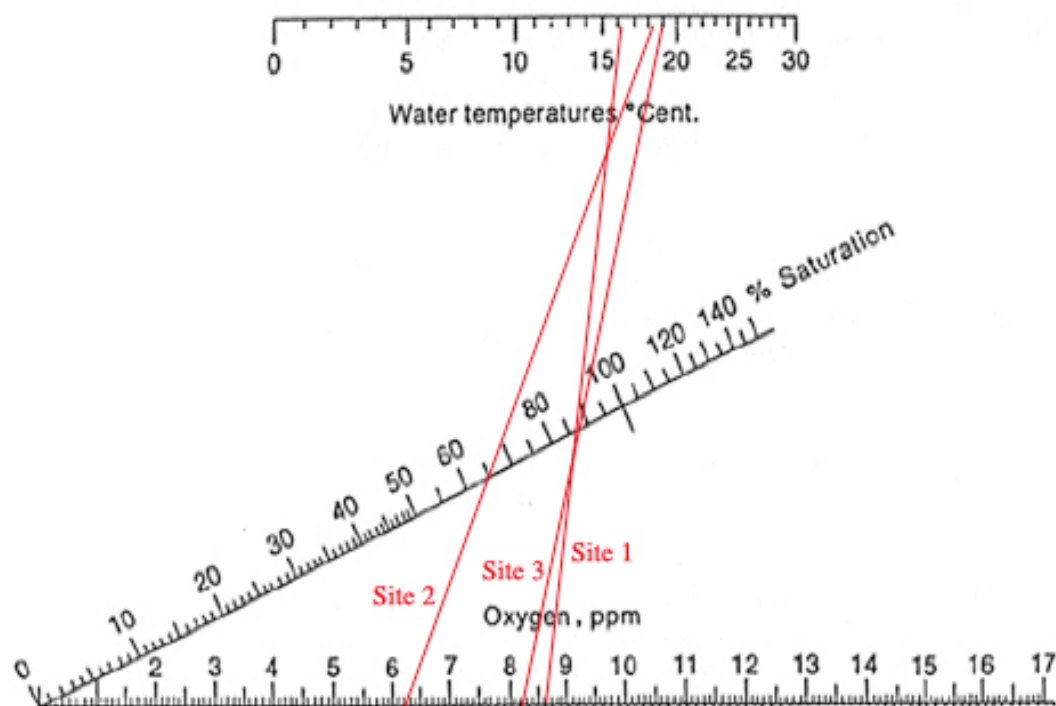
Sources: Data computed using DO calculator from Senese 2010 and air pressure calculator from Baillie 2010.

In a study done on streams in a river basin of Brazil (where only 16 percent of total sewage load is treated), researchers found that more polluted streams showed lower concentrations of DO compared to less polluted streams, and that low water periods caused lower DO. They observed the installment of a sewage treatment plant and noted an increase in DO after its installment (Daniel et al. 2002). This study implies that fecal matter significantly decreases DO in streams, and that increased stream discharge and therefore increased turbulence

cause increasing DO levels. These observations may offer possible explanations for DO at Sites 2 and 3 along the Quebrada Sin Nombre. Site 2 (below hotel) had DO concentrations significantly lower than Sites 1 and 3, possibly due to an input of sewage effluent from El Establo Mountain Resort. Observations of red puddles, the scent of fecal matter and a projecting pipe from the establishment over the stream gully support this hypothesis. Dissolved oxygen was particularly low in puddles 11-15 of Site 2, yet concentrations rebounded to normal levels by the end of the 120 meter transect (puddle 20). This trend is consistent with point source pollution, pollution that may be emitted from the hotel. Dissolved oxygen remained high at Site 3 (urban), but because discharge was much greater at Site 3 than at the higher elevation sites, the resulting high amounts of turbulence could help to explain the high DO.

Although dissolved oxygen concentrations for this study were measured in parts per million, it is useful to think about dissolved oxygen in terms of percent saturation as well. Percent oxygen saturation is calculated as the percentage of dissolved oxygen concentration relative to when completely saturated at a given temperature. As temperature increases, the concentration of oxygen at 100 percent saturation decreases (Water on the Web 2007; Shapley 2011). To determine the percent saturation values for average sampled DO concentrations of the Quebrada Sin Nombre, I used the following chart (Figure 4). For Sites 1 and 3 (headwaters and urban), average percent saturation are each approximately 87.5 percent. For Site 2 (below hotel), average percent saturation is estimated at about 65 percent. Typically, streams with percent saturation values near or above 90 percent are considered healthy, but dissolved oxygen is only one of many measurements used to determine stream quality (Water on the Web 2007).

Figure 4



To use chart: Draw a straight line between measured DO concentration (ppm) and water temperature (°C). Percent saturation is the value where the line intercepts the saturation scale.

Source: Taken from Water on the Web 2007; information in red added by author

The concentration of oxygen in water is essential for aquatic animals that depend on dissolved oxygen for respiration (Shapley 2011). The transfer of oxygen from the water to these organisms is only efficient above certain concentrations, so although oxygen may be present in a parcel of water, it may be at too low a concentration to sustain aquatic life (Water on the Web 2007). For invertebrates such as the Odonata, production can be impaired below values of 8 ppm, and individuals face severe mortality in waters below 4 ppm (Table 3). This explains why populations of Odonates were not observed below the hotel (Site 2), however, because DO concentrations were at healthy levels in the urban environment (Site 3), DO levels cannot explain the lack of Odonates in this transect.



Table 3

<b>Invertebrates</b>	<b>In Stream Dissolved Oxygen (ppm)</b>
<b>No production impairment</b>	8
<b>Moderate production impairment</b>	5
<b>Limit to avoid acute mortality</b>	4

Source: reproduced from Water on the Web 2007

### **pH**

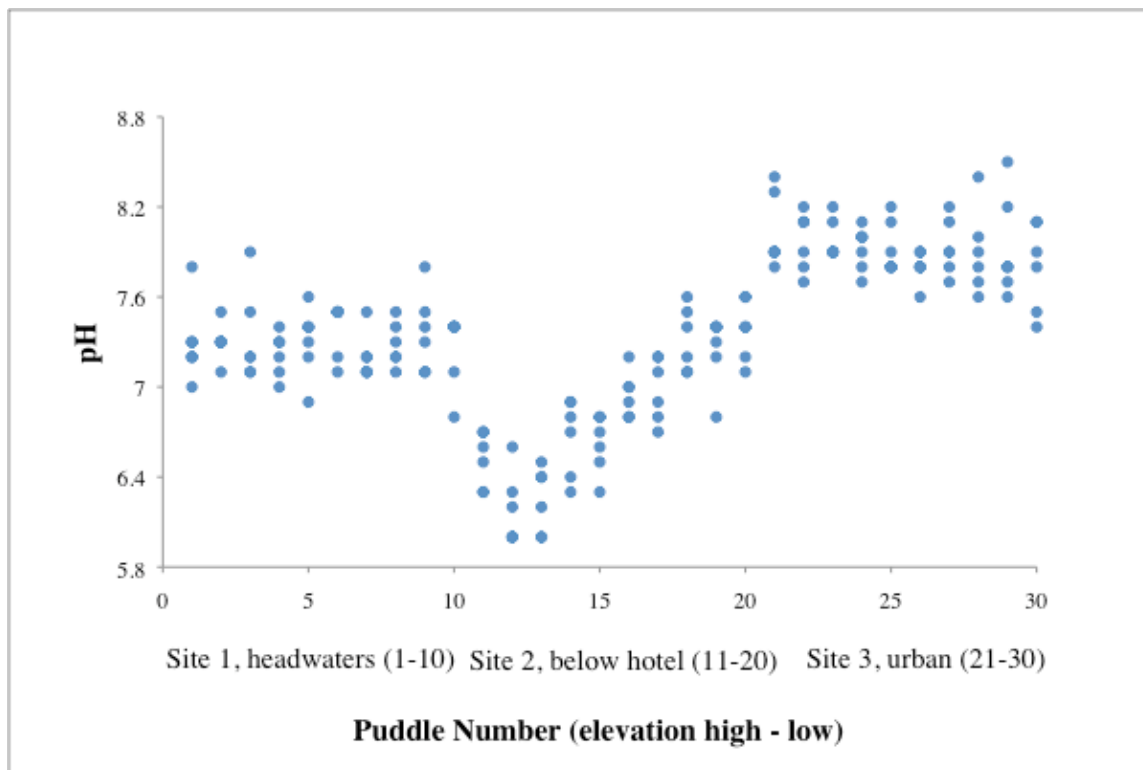


Figure 5: pH variation among 30 puddles at three sites along a stream in Monteverde, Costa Rica. Site location had a statistically significant effect on pH (randomized block ANOVA,  $F = 40.31$ ,  $p < 0.01$ ,  $df = 179$ ). A post hoc test showed that pH levels at Site 2 (below hotel) were significantly different from values at Sites 1 (headwaters) and 3 (urban), which were statistically similar (Tukey-test,  $q = 2.36$ ,  $p < 0.01$ ). Though the graph is presented in pH, data was converted into the negative log of the hydrogen ion concentration (mol/l) for statistical analysis. At Site 2, puddles 11-15 exhibited more acidic pH levels than in puddles 15-20, which were more neutral.

pH levels were neutral to basic at Site 1 (headwaters) and slightly basic at Site 3, though analysis identifies the two sites as statistically similar. Since Site 3 is located in an urban

environment, it is likely that the emission of household detergents into the stream contributed to these slightly basic pH levels (Mesner and Geiger 2010). The observation of foam from detergents supports my hypothesis that Site 3 had been polluted with grey water emissions. While natural pH levels normally fall between 6.5 and 9.0, water with a pH of 6 is 10 times more acidic than water with a pH of 7, and water with a pH of 8 is 100 times more acidic than a pH of 6 (Mesner and Geiger 2010). So although the pH levels measured on the Quebrada Sin Nombre could be considered somewhat normal for a stream (with the exception of values below 6.5 at Site 2, below hotel), the large variation within the stream and over a relatively short distance is alarming. pH is affected by many factors including surrounding soil, vegetation and precipitation patterns, however, the three sites along the stream share similarities among these factors. Therefore, it is likely that pH was affected by other, unnatural factors along the Quebrada Sin Nombre.

Though the mean pH value at Site 2 (below hotel) was 6.8, it is useful to look at the puddle-to-puddle variation of pH at this site. The upper half of Site 2 (puddles 11-15) had a mean value of 6.45 over the six-day sampling period, while the lower half (puddles 16-20) had a mean value of 7.18. The puddle with the lowest values (puddle 12) had a mean value of 6.18, while the puddle with the highest values (puddle 20) had a mean value of 7.38. Similar to DO, this high spatial variability within Site 2 could indicate point source pollution of fecal matter. In puddles where DO is low, pH is acidic, both of which are consistent with fecal contamination (Robertson et al., 1991). By the end of the Site 2 transect, both DO and pH recovered to levels closer to those at Sites 1 and 3.

Slight changes in pH can have large impacts to aquatic life, as most aquatic plants and animals are adapted to a specific pH. Even moderately acidic water can reduce reproduction

success in aquatic animals, as fish and insect gills are irritated and membranes are damaged. Acidic water is also able to more easily dissolve heavy metals such as lead and cadmium, which become even more toxic when dissolved in water (Mesner and Geiger 2010). In the Quebrada Sin Nombre, Odonates were unable to successfully reproduce in both the slightly acidic and slightly basic environments. While pH levels did not alone determine the Odonates' distribution, pH is likely a factor.

### ***Temperature***

Temperatures progressively increased along the Quebrada Sin Nombre as elevation decreased from Site 1 to Site 3, however, it is unknown if this increase was due to adiabatic lapse rates or to other factors, such as increasing input of grey water or black water contamination, or increasing solar radiation as a result of decreasing vegetation cover. Explanations for how this temperature variation potentially affected dissolved oxygen concentrations were give above under the *Dissolved Oxygen* subheading (Figure 3).

### Nitrate and Phosphate

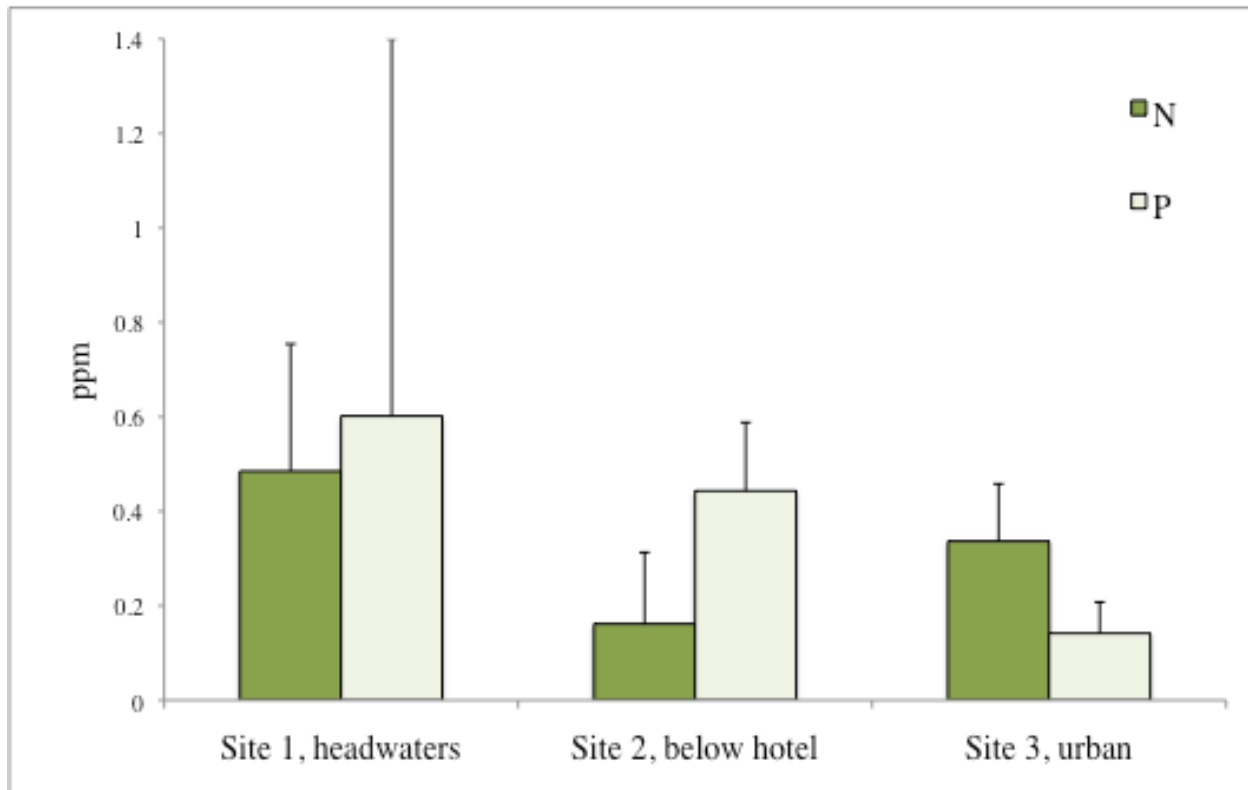


Figure 6. Average nitrate and phosphate concentrations over a six-day sampling period at three sites along a stream in Monteverde, Costa Rica. For both nitrate and phosphate, samples from the three sites were statistically significantly different from one another (Nitrate: Kruskal-Wallis ANOVA,  $H = 7.24$ ,  $p < 0.03$ ,  $n = 18$ ; Phosphate: Kruskal-Wallis ANOVA,  $H = 6.86$ ,  $p < 0.03$ ,  $n = 18$ ). Error bars represent one standard deviation.

Nitrate and phosphate levels were lower at Site 2 (below hotel) compared to Site 1 (headwaters), despite the fact that Site 1 is a more pristine environment. This trend could be explained by the presence of brown and green algae at Site 2. Algae grows as a result of high inputs of nitrate and phosphate, but as it grows, it then depletes the nitrate, phosphate, and DO concentrations of the water (Fried et al. 2003). Therefore, it is possible that larger concentrations of nitrate and phosphate existed at Site 2 prior to the study, but that concentrations had been significantly depleted by the algae during the sampling period. Further, algae growth could explain the low DO at Site 2. Nitrate was also low and phosphate was lowest at Site 3 (urban),

however, this contradicts previous studies, which state that urbanization generally leads to high nitrate and phosphate concentrations in urban catchments (Paul and Meyer 2008). Therefore, it is unclear why nitrate and phosphate concentrations in the urban environment were significantly lower than those in the more pristine environment nearest the stream's headwaters.

While naturally occurring concentrations of nitrogen and phosphorous vary depending on ecoregion, appropriate concentrations of nitrogen and phosphorous generally range from 0.12 – 2.2 ppm and 0.01 – 0.075 ppm respectively (US EPA 2002). Nitrate concentrations at each of the sites were below 0.49 ppm, indicating natural levels along the stream, however, phosphate levels were each above 0.14 ppm, indicating elevated concentrations beyond normal. Possible explanations for seemingly unnatural phosphorous concentrations could include an unknown factor contributing to increased concentrations, or simply that these standards may not apply to neotropical cloud forests. In addition, measuring nitrate and phosphate using a field test kit could have produced methodological error, as opposed to in-lab testing which would have produced more precise results.

## Odonate Populations

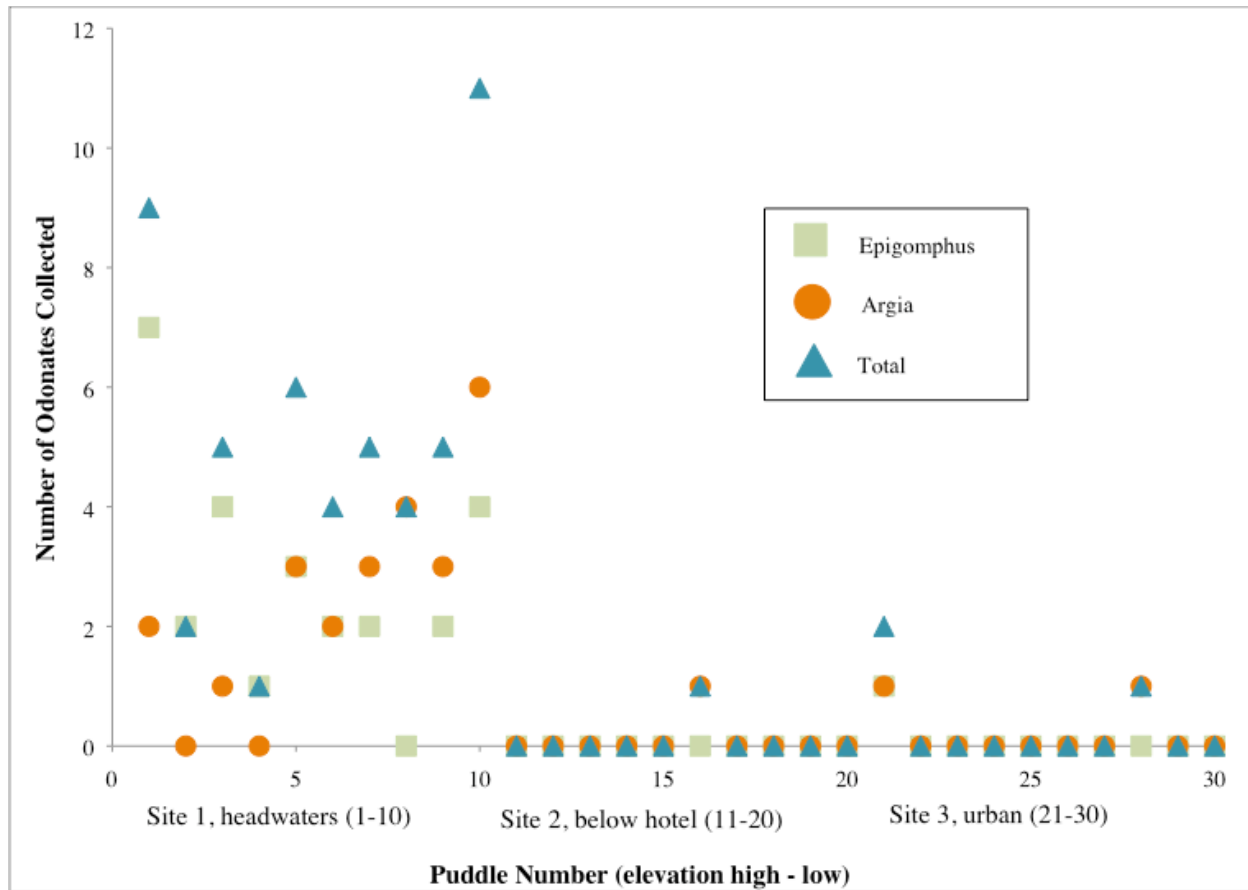


Figure 7. Sampled Odonate populations at three sites/30 puddles along a Monteverde, Costa Rica stream. Both populations of genera *Epigomphus* and *Argia*, as well as the total abundance of all larvae collected, severely declined from the headwaters of the stream to the urban environment. *Brechmorhoga* was left out due to the fact that only one specimen was found at all sites. Ninety-three percent of Odonate individuals, including the specimen from *Brechmorhoga*, were found at Site 1.

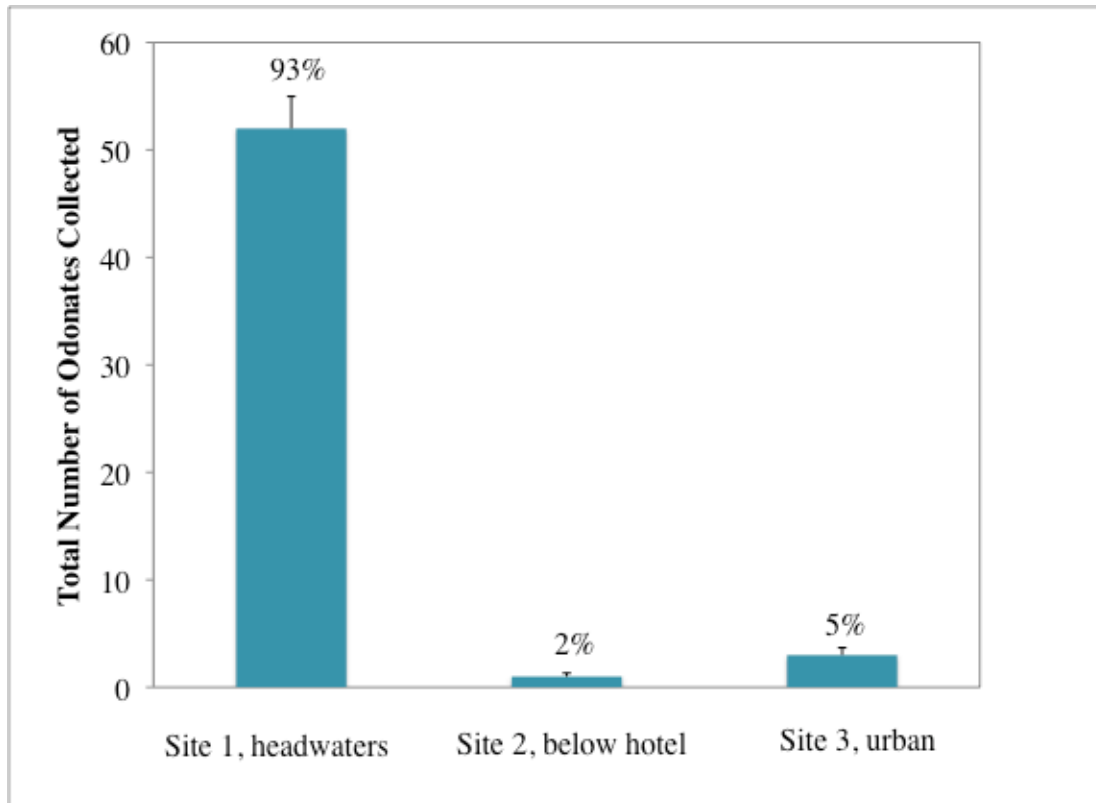


Figure 8: Odonate abundance at three sites along a Monteverde, Costa Rica stream. Abundance at Site 1 was statistically significantly different from Sites 2 and 3, which were statistically similar (randomized block ANOVA,  $F = 26.63$ ,  $p < 0.0001$ ,  $df = 29$ ; Tukey-test,  $q = 4.45$ ,  $p < 0.01$ ). Errors bars represent one standard deviation.

The vast majority (93%) of the Odonate larvae collected were found at Site 1 (headwaters), indicating that the Odonates prefer high concentrations of DO coupled with neutral pH, and possibly cooler temperatures. However, it is unclear whether Odonate larvae prefer the greater concentrations of nitrate and phosphate detected at Site 1, or whether concentrations do not play a biologically significant role in their spatial distribution. In a study that sampled the abundance of adult and larval dragonflies in Brisbane, Australia, researchers found that the abundance of the dragonflies significantly decreased downstream from a sewage treatment plant, as only one of 36 species was found at the most contaminated site (but in very low numbers) (Watson et al. 1982). Other studies support this research that high quantities of Odonates are

indicative of clean water, as Odonates hold a narrow tolerance for pollutants (Imoobe and Ohiozebau 2009). In terms of overall abundance declining with the presence of contamination, my research supports the conclusions made by these various studies. A study focused specifically on Costa Rica and Central America reported that some species of *Argia* can survive in high contamination, but that *Epigomphus* are intolerant to stream contamination (Ramirez 2012). My data do not support these findings, as neither genus was found in abundance at Sites 2 and 3, both of which could contain pollutants from black or grey water. My data show that neither *Argia* nor *Epigomphus* tolerate pollution in the Quebrada Sin Nombre, and that each greatly favors the healthy stream conditions above the influence of human establishments such as El Establo Mountain Resort and urban homesteads.

## **Conclusions from Case Study**

This case study sought to evaluate the hypothesis that El Establo had contributed to the degradation of the Quebrada Sin Nombre. There is observational evidence to suggest that the hotel is polluting the stream, most likely through point source pollution, and this evidence is supported by low levels of dissolved oxygen, acidic pH values and the absence of Odonates. In addition to pollution from fecal matter, the large landfill observed on the property edge of El Establo could also be contributing to stream degradation. When this trash is burned, harmful chemicals can be leached into the stream and released into the atmosphere. Although there is no physical stream parameter indicating distinct pollution at Site 3 (urban), it is clear that Odonates do not prefer to live in urban environments characterized by litter and household waste. If grey and black water pollution from point source and nonpoint source pollution have the ability to eliminate populations of Odonates in the stream, it is likely that other organisms are also affected. This poses problems for the future, as our livelihood depends on properly functioning



watersheds. In Costa Rica especially, well-functioning watersheds contribute to the country's rich biodiversity that allows the country to continue to grow as an international leader in ecotourism.

Case studies such as this can have large implications for Costa Rica's Certification for Sustainable Tourism, as they would further weed out green washers who may be undeserving of a certification seal. The CST website markets El Establo as having a conservationist tradition as part of its fundamental operation, more than 80 percent of its property covered with plants and forest, three water treatment plants, energy resources managed by a highly efficient computerized system, and a rigorous code of good environmental practices in all service areas. The website also asserts that the hotel has done hard work to support the progress of Monteverde through collaborations with different schools and cultural programs so that visitors can experience this culture. On the other hand, Honey and Bien (2005) have indicated in their studies that they have seen "small charming hotels that become so successful that they expand to a point where they lose their character and even their sustainability" indicating El Establo as a prime example.

In examining the Hotel Establo's final evaluation (posted on the CST website), I found that the hotel is severely lacking in the categories of employee training (hotel complied with 0 of 6 listed criteria), sustainability policies making (0 of 5), waste management (3 of 12), measurement of success of the CST (0 of 4) and food/cosmetics/cleaning products consumption (8 of 18). Below is a small sample of the 153 questions from the evaluation, with El Establo's final answers denoted in paranthesis.

- "The company has established its mission and has designed a sustainability policy for the hotel. Weight 1" (NO).

- “Hotel employees are aware of the scope of the mission and policies for sustainability. Weight 2” (NO).
- “Water consumption is monitored continuously by a meter. Weight 1” (YES).
- “There is a plan that sets out the goals of saving water that the establishment has raised. Weight 1” (NO).
- “The company uses new technologies for energy saving lighting, refrigeration and other (automatic switch-off, presence switches, circuit disabling, etc.) Weight 2” (YES).
- “The company is using some form of alternative energy (photovoltaic cells or other solar systems, for example) for illumination. Weight 3” (NO).
- “The company uses biodegradable cleaning products that are non-corrosive or non-toxic. Weight 1” (NO).
- “The company has suitable containers for trash separation (aluminum, plastic, glass and paper). Weight 2” (YES).
- “The housing staff separates trash when the client does not. Weight 2” (YES).
- “The hotel participates in a recycling program in which sent debris is properly classified. Weight 3” (NO).
- “Solid waste generated by the company is properly stored before its final disposal. Weight 2” (NO).
- “There is a manager in the company who handles waste and procedures for reducing waste are known to all employees. Weight 1” (NO).
- “The organic waste produced on site is used in a composting program or other appropriate application. Weight 2” (NO).

- “The company provides information about cultural activities that are taking place in the region. Weight 2” (NO).
- “Each room has the information and facilities necessary for the customer to save water and energy. Weight 1” (YES).
- “The customer has access to a form for comments or complaints about the CST program and on the functioning of the hotel. Weight 2” (NO).
- “The company provides practical actions that discourage sexual harassment and promote equality of opportunity for both sexes. Weight 1” (YES).

El Establo received a weighted compliance percentage of 47.72 percent for physical-biological environment, 44.03 percent for infrastructure and services, 32.35 for external client and 49.12 for socio-economic environment. The Certification for Sustainable tourism granted the hotel one leaf as a result of the hotel’s minimum 32.35 percent compliance. However, these numbers may be greater than the hotel’s true compliance, since auditing of the hotel is not performed regularly and hydrologic and observational evidence suggest otherwise. Many of the questions and answers listed above seem contradictory, which contribute to this lack of validity. For example, the hotel is “certified sustainable,” however, the hotel admits on the questionnaire that it has neither designed a sustainability policy nor are employees aware of the hotel’s sustainability mission. The hotel continuously monitors its water consumption by meter, however, it doesn’t have set goals for reducing water consumption. The hotel has “suitable containers for trash separation (aluminum, plastic, glass and paper)” and “the housing staff separates trash when the client does not,” but the hotel does *not* participate in a recycling program where waste is properly classified and generated solid waste is not properly stored

before its final disposal. So, while the hotel may be separating its trash from its recyclables, it is not clear whether or not these recyclables are being sent to a proper recycling facility (my observations indicate that trash and recycling is not always separated, and that this waste is sometimes burned by the hotel). In addition, it is hard to believe that housekeeping staff are separating trash from recyclables, being that the hotel evaluation states that its employees are not aware of mission and policies for sustainability. Thus, the hotel is receiving compliance points for actions such as separating waste without complying with the ultimate factor, being “is the recycling being recycled?”

### **Analysis of the CST using other certification programs**

In evaluating the reliability Costa Rica’s Certification for Sustainable Tourism, it is helpful to examine the processes of comparable certification schemes. I chose to compare the CST to Ecuador’s Smart Voyager certification program and Green Globe International’s program based on their differing sectors: government sponsored (CST), non-governmental (Smart Voyager) and public (Green Globe) (Table 4).

Smart Voyager is a certification program developed and administered by the non-governmental organization Conservation and Development, in an attempt to minimize the environmental impacts of tourism in South America. Smart Voyager Water was established in 2000, and in 2002 was recognized by UNESCO as an model framework of sustainability. Initially designed to generate changes in the management of Galapagos Islands tour boats, the program expanded in 2003 include hotels with the implementation of Smart Voyager Earth. Designed to include both large chains and small ecolodges in major cities and remote mountain villages in South America and Central America, Smart Voyager Earth is guided by 13 principles,

including the conservation of natural ecosystems, just and fair treatment of workers, integrated waste management and emissions control (Conservation and Development 2012; Smart Voyager 2011).

The Green Globe certification program is based in Los Angeles, California and is an affiliate member of the United Nations World Tourism Organization. The publicly traded company provides services in 83 countries and has partnerships in Mexico, South America, South Africa, the Middle East, the Caribbean and Europe (Green Globe 2012). Established in 1994 by The World Travel and Tourism Council, Green Globe was designed to promote environmental management and awareness programs internationally. In 1997, in response to criticism regarding the reliability of the program, Green Globe created a more stringent system of performance standards and third party verification (Toth 1998). There are over 2,400 Green Globe clients in 26 different sectors of tourism, 1036 of which are certified and 270 of which fall under the category of certified hotels and resorts. Audits are conducted by regional accredited auditors who have undergone Green Globe Certification training and are registered annually. To promote its business, Green Globe has media relations with various organizations including Travel Mole Profile, Islands Magazine, AAA, Travelocity Bloomberg, Reuters, the Wall Street Journal, Forbes, Associated Press, MSN Money and CNN Money (Green Globe 2012).

Table 4

		<b>CST, Costa Rica</b>	<b>Smart Voyager, Ecuador</b>	<b>Green Globe, International (US)</b>
<b>Sector</b>		Non-profit, government sponsored	NGO (Conservation & Development), non-profit	Public Company
<b>Annual Membership</b>		free	info unavailable	\$750 - \$5,000 (not including auditor fees)
<b>% compliance for membership</b>		> 20%	info unavailable	> 51%
<b>ease of membership (paperwork, online services, etc.)</b>		moderate (must present paperwork in- person)	info unavailable	easy (good online services)
<b>3rd party verification?</b>		yes	info unavailable	yes
<b>training/help provided?</b>		yes	yes	yes
<b>criteria</b>		moderate - extensive	info unavailable	extensive
<b># of compliance indicators</b>		153	info unavailable	337
<b>standards updated?</b>		info unavailable (literature suggests infrequently, if not at all)	info unavailable	yes, twice per year
<b>standards based on UN Earth Summit?</b>		info unavailable	info unavailable	yes
<b>certified hotels</b>		191	22	270
<b>tiered levels?</b>		yes	no	no
<b>evaluations available for consumer viewing?</b>		yes (Spanish only)	no	no

Sources: CST 2012, Smart Voyager 2011 and Green Globe 2012

Green Globe and Smart Voyager can be considered opposite ends of the spectrum in terms of structure, information availability and organization size. Costa Rica's Certification for Sustainable tourism fits somewhere in the middle of this spectrum. In the above table, you can see that there is little information available regarding Ecuador's Smart Voyager certification program. The website and supporting websites are vague: they give inadequate descriptions of the program as a whole, and they fail to provide sufficient information regarding the certification process, criteria and compliance. So, the program could be very successful and admirable, yet outsiders have no way of gauging its reliability. This is a fundamental flaw of the certification, as insufficient public information allows room for speculation regarding a program's validity and credibility. On the other hand, the CST and Green Globe both have advanced websites with full-fledged descriptions of the entire certification program. Green Globe, because it is a public company, advertises itself very well, so this information is being seen by many people. The CST has not been as successful in promoting its program. On the other hand, unlike Green Globe, the CST posts hotel evaluations on its website for public viewing. The more information made available by a certification program, the more-likely the program is credible. In this regard, Costa Rica's Certification for Sustainable tourism can be considered very credible.

A major difference between the CST and Green Globe certification schemes is the fact that Costa Rica's program uses a tiered system, while Green Globe uses a pass/fail system. To review, the CST awards hotels with one to five leaves based on percent compliance, and a hotel can be certified at the lowest level with as little as 20 percent compliance. On the other hand, Green Globe certifies businesses that achieve at least 51 percent compliance, but an establishment scoring a 52 percent is not distinguished from an establishment scoring a 90

percent. These differing schemes each have benefits and drawbacks. A tiered system like that of the CST provide a path to sustainability where there is relatively simple achievability at the bottom to encourage widespread participation, while allowing room for improvement at the top. However, as noted by workshop participants of the Committee on Certification of Sustainable Products and Services (2010), the tiered approach has not been successful in providing motivation or guidance to weak performers. Instead, participants argued that occasionally raising standards could be a more effective way to raise the bar and floor for performance. Green Globe's policy of complying with at least 51 percent of certification criteria is good in that it maintains a high baseline for certification, meaning that it is more difficult to receive a certification seal, however, this system does not provide incentive for hotels to continuously improve their sustainable practices, as they receive no added certification benefits for maintaining 51 percent compliance versus 100 percent compliance. It appears that a tiered system works very well for the CST, however, the program may be setting the bar too low by requiring only 20 percent compliance to receive one leaf.

While the CST and Green Globe both have programs that integrate third party verification, which is key to ensuring the credibility of a program, both websites fail to provide information regarding the frequency of the auditing process. This is an important aspect of certification, as hotels can falsify or only temporarily implement their sustainability procedures when they are first being certified and audited, or sustainability procedures can be severely augmented or eliminated with a change of staff, management or ownership. Without regular auditing, it is difficult to consider a certification system truly "credible." In this regard, the CST ranks low in terms of credibility, as the program does not ensure consumers that regular auditing takes place.



Changing times, improved technology and new knowledge regarding sustainability make it necessary for certification standards to be consistently updated. According to its website, Green Globe updates its standards twice per year. Though the CST website does not provide this information, it is suspected that the CST standards have not been updated for at least seven years. According to previous literature, the 2005 questionnaire contained 153 items, presumably the same 153 items on the current questionnaire (Honey and Bien 2005). Moreover, this previous literature affirmed that the CST website has been left un-updated for several years at a time, listing hotels that were no longer in business. Frequent updating is crucial for certification programs, as out-dated information is not always credible. If certification standards are not regularly updated, the certification system could become archaic and lose both credibility and popularity. This is a future possibility for the CST.

## **Discussion**

Costa Rica's Certification for Sustainable Tourism seeks to reduce the negative impacts of conventional tourism to both ecosystems and communities through third party verification. There are varying opinions regarding the success of the CST, however, in general, previous literature suggests that although the program is widely considered one of the world's most successful certification systems, the system contains several flaws that have damaged the program's reliability and reputation. Likewise, I found little quantifiable evidence regarding the program's ability to promote sustainable change. My analysis suggests that the system embodies both strengths and weaknesses that either facilitate or hinder the reliability of the CST. The fact that the CST is non-profit and government sponsored seems to contribute to the program's success, as NGOs can fail in the absence of governmental support and public companies can

discourage participation due to high membership fees. Having a tiered system allows the CST to encourage widespread participation and continuous improvement, however, a minimum compliance of 20 percent sets the bar too low. For example, a hotel can be recycling on the one hand, yet using a ton on energy related to air conditioning on the other hand. The program must remain flexible enough to maintain high numbers of participation, but stringent enough to maintain its credibility. My investigation of the CST implies that the program has not yet reached an adequate level of stringency.

The certification criteria and performance indicators of the CST appear to be rigorous, especially when considering the fact that some questions are weighted more heavily than others. However, in-depth analysis by LePree (2008-2009) and Honey and Bien (2005) revealed certain inadequacies. LePree argues that the CST encourages the commoditization of local culture rather than encouraging the preservation of the local culture, while Honey and Bien contend that it fails to give adequate attention to lodging establishments that are involved in land preservation and the prevention of environmental threats such as logging and poaching. Since the CST's criteria have not been updated in almost a decade, this raises the question of whether the outstanding criteria still targets the overarching goals of sustainability, a field that is constantly progressing. If criteria are not continuously updated based on new scientific research and knowledge, then the CST is not allowing space for innovation within the sustainable tourism sector.

One thing to remember is that Costa Rica's Certification for Sustainable Tourism is voluntary, meaning that hotels are rewarded for doing well, but that the program does not have the authority to penalize non-compliers. Realistically, no businesses will voluntarily enter such programs if they are threatened with sanctions, so certification schemes will always be weak in

that aspect. The only way a hotel can be “punished” is if market forces create a disadvantage for non-sustainable hotels, in other words, consumers stop choosing to stay at that hotel. However, if the program is not functioning properly, a non-compliant hotel may still be certified. This brings about the issue of having a strict auditing process.

My research and analysis suggests that the CST is under-regulated, as the auditing process is not preformed frequently enough. Honey and Bien (2005) argue that the CST’s technical staff is too small to handle all of the hotels, despite the fact that its inspection process has been systematized. Not only is the auditing process infrequent, it merely inspects a hotel’s management processes (inputs) rather than the consequences of these updated processes (outputs). The CST relies on the belief that changing certain practices will produce sustainable outcomes, however, the program does not perform baseline assessments against which it could measure improvements in performance. Additionally, when conducting site visits, auditors do not require the hotel to measure, or the auditor himself does not measure, these sustainable outputs. Case studies such as that of El Establo Mountain Resort in Monteverde can be used to improve and advance the CST’s auditing process, as a scientific site visit can ensure that a contradiction does not exist between a hotel’s sustainability efforts and its sustainability outputs.

The success of Costa Rica’s Certification for Sustainable Tourism should ultimately be determined by consumers themselves. It is therefore important to ensure that consumer awareness is high in order to create a market shift from conventional to sustainable tourism. The CST’s extensive website allows consumers to make informed decisions, however, much of the website information is only available in Spanish, such as individual hotel evaluations. In addition, if the CST’s rating system is not promoted and advertised, consumers are unable to make informed purchasing decisions. For example, the average American may see a CST

certification seal on a hotel website and presume that the hotel is a bona fide, outstanding-sustainable hotel. However, the consumer is unaware of the program's five-level rating system, chooses a hotel with one-leaf and is dissatisfied when he reaches his destination. This "leaf" nomenclature does not inform good consumer buying decisions if the nomenclature is not marketed. Since the CST is non-profit and certifies businesses without payment, funding is an issue at the heart of the program's success, and several of the aforementioned inadequacies may be direct results of monetary deficiencies.

## **Conclusions & Recommendations for the Future**

By examining the policies and processes of Costa Rica's Certification for Sustainable Tourism, reviewing previous literature regarding third party certifications and the CST, conducting a case-study of a certified hotel and comparing and contrasting the CST with other certification schemes, I have concluded that there are several inadequacies that the program must address in order to ensure its credibility and create a certification seal that consumers can trust. In general, rather than encouraging hotels to improve their efforts, the CST must encourage hotels to increase their positive impacts to sustainability. While there are practical obstacles that need to be overcome in order to implement the following recommendations, they can serve as a platform for the CST to ensure the program's credibility and ability to produce sustainable outputs.

(1) *Expanding financing options:* It seems that the CST is somewhat limited monetarily. Further funding to enlarge the CST technical staff could come from government subsidies funded by increased tourism taxes. Another alternative would be to create an intern program where young

people could receive university credit for performing administrative work, accompanying trained auditors on site visits or becoming trained auditors themselves.

(2) *Increasing the baseline for certification membership:* If Costa Rica wants to maintain its “green” reputation, the CST needs to implement a baseline for sustainability, as certification should be a program where hotels go above and beyond the bare minimum requirement for sustainability. Like the LEED building rating system, the CST could establish a minimum requirement to be baseline certified, then award incremental designations based on beyond compliance. This system would require that every certified hotel meets the minimum requirements of sustainability, rather than simply complying with an arbitrary 20 percent of the easiest criteria. For example, a hotel could only be baseline certified if 10 very important fundamental notions of sustainability are met (for example, setting annual sustainability goals, designating a sustainability coordinator within the staff, developing a sound waste management plan, employing at least *n* percent locals, being associated with a private reserve, etc.). Then, implementing compost, installing solar power and creating a community garden could be considered “beyond compliance,” allowing a hotel to move from baseline certified to a higher level of certification.

(3) *Implementing standards that measure the hotel’s impacts:* The CST should have more compliance indicators that measure impacts (environmental and societal outcomes) rather than just management performance. Measurements could include those of waste diversion statistics, stream quality, kilowatt usage, water usage, anonymous worker happiness indices, economic impacts to the local community and many more. Designating a hotel staff member as a

“sustainability coordinator” could help hotels to execute these measurements and align more closely with the CST. Reporting these numbers to the CST would then help the program to ensure compliance by hotels and also help the CST to measure its own success.

(4) *Creating a more stringent auditing process:* Auditing should be done regularly and by qualified, local technicians. More local auditors conducting random site visits would ensure that hotels are not falsifying their sustainability procedures. While a frequent auditing process may be limited by insufficient funding, a solution to this is proposed below under recommendation number six.

(5) *Improving and marketing the certification’s nomenclature:* The “leaf” classification either needs to be well advertised or switched to a more recognizable nomenclature, such as “bronze”, “silver” and “gold.” Consumers should understand what they are paying for when booking a “one leaf” hotel versus a “five leaf” hotel, as they understand the distinction between bronze, silver and gold designations.

(6) *Publicizing information, enabling consumer input and increasing market demand:* The CST website should provide a consumer portal, either made public or private, where hotel customers can review each hotel’s sustainability practices. Hotels that receive frequent poor reviews would then be audited more frequently by the CST’s third party evaluation staff. This process would cut costs, as not every single hotel would need to be audited one or twice per year. Likewise, more information should be made available to consumers, including but not limited to hotel output reports. The United States accounts for almost half of Costa Rica’s tourism industry, so

CST publications should be made available in English in addition to Spanish. As noted above and in section five, it is important that consumers be educated in order to make informed purchasing decisions. Consumers should not only prefer to buy certified products, but they should be aware of and demand verifiability by the certification organization. If consumers are impartial, then there is little incentive to have a certification process in the first place, and less incentive to maintain the program's validity. Increasing the market demand for certified hotels is key to the CST's success, and this can be achieved through extensive marketing campaigns that stress the importance and necessity of sustainable tourism.

(7) *Incentivizing hotels:* To encourage greater participation by hotels, allotting incremental tax breaks to hotels achieving levels one to five would provide incentive for hotels to continuously strive for a higher level of sustainability. Hotels could be further incentivized if the CST rewarded top performers with annual sustainability awards, such as "Greatest Waste Diverter for 2012." Other incentives include increased marketing by the CST for top performers, more country-wide workshops to educate hotel owners and managers about easy, cost-saving sustainability procedures and workshops to brainstorm the future of CST. Stakeholders should meet to evaluate the CST's criteria and further recommend improvements for the future.

As tourism is one of the largest and fastest growing economic sectors in the world, it is important that the concept of sustainable tourism certifications be fully understood, goals outlined, and processes put in place. In Central America especially, places like Costa Rica are rapidly expanding their tourism sectors, creating even more need for sustainable designs that attempt negate to negative impacts of conventional tourism. Successfully implementing

sustainable tourism schemes in Costa Rica can have global impacts, as the small country represents just 0.01 percent of Earth's surface area while harboring more than five percent of the world's biodiversity. Because Costa Rica's Certification for Sustainable is used as a model template by many other countries developing certification schemes, it is important that it improve its practices to truly become an admirable framework worth imitating. Nonetheless, as LePree (2008-2009) notes, sustainable tourism will only become possible when local governance structures allow communities to influence the development of their own lands and the structure of their local economy. In other words, local governance will lead to the proper enforcement of urban planning laws, waste management laws, community building and ultimately sustainable lifestyles. In accordance with thriving governance, a successful certification program is achieved through a balancing act consisting of many factors and is not harvested overnight. However, certification is only as valuable as it is legitimate. Without analysis of what works, what doesn't and why, it is unlikely that Costa Rica's certification program will become unquestionably reliable and truly successful in terms of transforming the Costa Rican tourism market from one of conventional tourism to sustainable tourism.



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